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Convalescent Measles and Scarlet Fever Serums: their use in Prophylaxis and Therapy*

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SINCE Park (1), and Nicolle and Conseil (2) independently, first demonstrated, each in a large series, the potency of convalescent serum in the prevention of measles, their work has been verified in still larger groups in many parts of the world.

The only difficulty mentioned by most workers is that of securing convalescent measles serum in large enough amounts to allow for its general use. To solve this problem, laboratories for the preparation of convalescent serum affiliated more or less closely with local departments of health, have been established in a number of large cities of England, France and the United States. These laboratories have demonstrated that with a careful follow-up of recovered patients large amounts of serum can be obtained and can be stored for at least a year for use when measles again appears. By co-operation between laboratories, it should be possible for serum stored in places where the lessened incidence of measles creates a smaller demand, to be made available to other regions where it is needed.

Each adolescent or adult recently recovered from measles can furnish enough serum within four months after his illness to prevent or modify measles in from 60-100 children. It should be possible to collect enough convalescent serum to have it available for all children up to the age of five who are exposed to the

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disease. Fortunately, other materials, as will be mentioned later, are available in almost unlimited amounts from which one can prepare bland measles-preventing preparations for all children over five years of age who should be protected.

The high mortality from measles, or rather from its complications, in children under five years of age apparently is not generally realized. In children up to the age of one year the mortality is 8 per cent.; from one to three years 5 per cent.; and for the entire group under five it is 1½ per cent. Even after the age of five the mortality rate is not negligible, being from 0.1 to 0.2 per cent. It is apparent, therefore, that the later in childhood measles is contracted, the less risk this entails. It is obvious that the attempt should be made to prevent measles in all children up to the age of five. Since measles is a dangerous disease in all undernourished children or children suffering from other illnesses, irrespective of their age, one should attempt completely to prevent the disease in this entire group. In addition, complete prevention should be the object in children's hospitals and homes to prevent spread of the disease in epidemic form.

The proper amount of measles convalescent serum administered intramuscularly not later than the sixth to seventh day after exposure will be followed by prevention, or modification of the disease to an attenuated form, in about 98 per cent. of the instances.

The modified, attenuated disease is a very interesting one from several points of view. It is mild, causing but slight signs of illness or discomfort, but, nevertheless, confers an active, permanent immunity apparently as complete as that after the unmodified disease.

Modification of the disease, rather than complete prevention, can usually be achieved with one-half the dose of serum that will cause complete prevention. Therefore, we believe that it is a question of individual choice whether modification or prevention should be the object in healthy children in private homes who have been accidentally exposed to measles.

To prepare convalescent measles serum we obtain blood in quantities of 250 cc. from large adolescents and adults at intervals of two to three weeks during the first four months after their illness. We have never found this to cause any harm; on the contrary we find that in general the hemoglobin and red-cell count increase. The donors are paid $5 each time, and each bleeding yields about 100 cc. of serum net, after some is used for Wassermann, sterility and safety tests. Only Wassermann-negative, sterile serums are used, and the rigid technique of sterility and safety testing of the United States Public Health Service is followed. Thirty or more serums are pooled, 1/10,000 merthiolate (Lilly) added, and after Berkfeld filtration the serum is vialed and final sterility tests are carried out.

In the past year we have found that more serum is required to prevent measles in children in the 1-6 year age-group than previously was thought necessary, and, in fact, more is needed than to protect older children. As a result of this study we recommend now that infants up to the age of one receive 5 cc., children from one to ten, 10 cc., and those over ten years, 1 cc. for each year of age. Large adolescents and adults should receive 20 cc.

Recently we have been investigating the potency of pools of serum obtained from individuals five to twenty-two months after their illness. This serum, for convenience, we call "overtime" serum. The results of this investigation are being published separately (3) and show that a pool of serums, the average interval being ten months after illness, concentrated to one-half its volume by a simple, Cellophane-bag technique (4), is as potent as the regular convalescent measles serum, if not a little more so. This observation will enable us to make a large increase in our supply of convalescent measles serum.

It has been known for a long time that about four volumes of pooled normal-adult serum will have the same prophylactic efficacy as one volume of convalescent serum. It has been shown by Karelitz (5) that the globulin fraction of pooled normal serum, sufficiently concentrated, has the same efficacy, and we have verified this observation. We have found recently that pooled normal serum concentrated by the Cellophane-bag technique is similarly efficient (3). We have found, also, that either pooled ascites fluid concentrated by the Cellophane-bag technique or the globulin fraction of this fluid when sufficiently concentrated has the same efficiency (6). So far as is known, this is the first time that measles-preventing substances have been demonstrated to be present in ascites fluid and in sufficient amounts to be made of practical use by methods of concentration.

Whole blood, obtained usually from parents of the exposed child, has been used extensively in measles prophylaxis. This material can be used when convalescent serum or the other preparations described are not available. However, to secure similar prophylactic effects eight times as much whole blood should be used as convalescent serum. Since the fluid portion of the blood is only about 50 per cent. of its volume, eight volumes of blood is the equivalent of four volumes of normal serum. The dose of whole blood usually recommended is 25 cc., which is much too small. The amount of blood which should be injected is a disadvantage, as well as the slowness of absorption and the possibility of the transmission of syphilis, which has been reported several times.

Thus, the amount of bland measles-preventing preparations from human serum or ascites fluid can be increased at will so that enough can be made available for universal use. A special advantage of these materials is that only rarely does a subcutaneous or intramuscular injection cause a local reaction, and even more rarely a general reaction, with never more than a degree or two of temperature, with no sensitization to subsequent injections and only occasionally a mild, urticarial type of serum sickness.

In addition, properly prepared, pooled human serum or concentrated serum can be injected intravenously with similar minimal risks, and, in fact, in some patients this route of injection is recommended as the one of choice to secure rapid and maximum therapeutic results.

Formerly it was thought that since measles is a virus disease, once its earliest manifestations had developed, it would be impossible to modify its course by the therapeutic use of serum. At Willard Parker Hospital, New York, Kohn, Klein and Schwarz (7) demonstrated that 50 cc. of convalescent measles serum administered intravenously to children who are in the pre-eruptive stage

of measles, showing Koplik spots, will mitigate the disease in about 85 per cent. (25 children treated), so that, in brief, the resulting disease can be characterized as a mild, one-day illness. The importance of this observation is that many children already seriously ill with, say, diphtheria or poliomyelitis, who are discovered to be developing measles, can be saved the added risk of a severe attack of the unmodified disease.

Once the eruptive stage of the disease has been reached, it is questionable whether even large amounts of convalescent serum can confer demonstrable benefit, although there are some competent observers who believe that even this can be accomplished.

CONVALESCENT SCARLET FEVER SERUM

Convalescent scarlet fever serum is prepared in the same way, with the same time elements as are observed in obtaining convalescent measles serum.

Using somewhat larger doses it has been found efficient as a prophylactic. About 85 per cent. of the children who have been in intimate contact with patients with scarlet fever and who, from experience, can be expected to develop the disease have failed to do so after receiving convalescent scarlet fever serum. The dosage is 10 cc. for children up to five years of age, 20 cc. for those from five to ten years, 30 cc. for adolescents and 40 cc. for large adolescents and adults.

The therapeutic use of convalescent scarlet fever serum, however, has given very dramatic results in from 75-80 per cent. of the patients receiving adequate amounts of this serum intravenously within the first 36-48 hours after the onset. For therapy, children up to the age of five should receive 20 cc. intravenously, from five to ten years, 40 cc., from ten to fifteen years, 60 cc., and large adolescents or adults, 80-100 cc. Usually within 12 to 18 hours there is an abrupt fall in temperature to normal, relief from toxicity and fading of the rash. Many times a desperately ill child is converted into a convalescent patient. Similar but slower results are obtained from the intramuscular injection of this serum. However, since 14-18 hours must elapse before complete absorption takes place after intramuscular injection and the level of antibodies in the blood is only half as high, we recommend that twice the intravenous dose be given when serum must be administered intramuscularly. Even then, the results are slower in their appearance. Children receiving serum early in the disease usually require only one intravenous injection.

It is recognized that the antitoxic content of convalescent scarlet fever serum is usually from 2-10 antitoxic units per cc. This is only a small fraction of what is present in scarlet fever antitoxin as prepared in the horse. Since the therapeutic results of the recommended doses of convalescent serum are equally as good as those obtained with much larger amounts of heterologous antitoxin, if not better, it has been thought for some time that there must be antibodies in scarlet fever other than antitoxin responsible for these good therapeutic results. Top (8) has come to the same conclusion. Recently, Moore and Thalhimer (9) have shown that substances are present which, when added to whole blood, will

markedly increase the bactericidal power of the whole blood. Opsonins are known to be present and other antibodies may be present as well.

Besides the therapeutic response described, it has been found that the number of the usual complications of scarlet fever are reduced by convalescent serum to one-third, and those that do develop are less severe.

Therapeutic benefit is obtained, also, in patients in whom severe complications already have developed, or in many who have been brought to the hospital late in the course of the disease. In individuals with severe complications, however, multiple injections of serum are needed. These should all be administered intravenously, and sometimes should be given daily or even at four-to-six hour intervals at the beginning of therapy. The results which are obtained are not always dramatic, but are quite consistently good.

Other hemolytic streptococcus infections besides those arising from scarlet fever have many times responded to therapy with convalescent scarlet fever serum. Here, too, the serum should be given intravenously, in large amounts, and at frequent intervals until a therapeutic response occurs. Some of the conditions treated have been erysipelas, phlegmons, idiopathic peritonitis, blood stream infections, etc. At times, this serum therapy is combined with sulphanilamide, and this probably is the method of choice. In some individuals first treated with sulphanilamide without demonstrable benefit and in other patients who could no longer tolerate sulphanilamide, convalescent scarlet fever serum has been substituted with benefit, and, at times, with apparent cure, where the patient's life had been despaired of. Since there is no method of standardization in these conditions and since no two of them are the same, alternate case treatment and statistical evidence are not available. It may be significant that as the availability of this serum becomes more widely known it is being more and more extensively used in the treatment of various types of hemolytic streptococcus infections.

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Antipneumococcus Serum Treatment of Pneumonia

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BEGINNING in 1930 antipneumococcus horse serum was used in the treatment of pneumonia in the Toronto Western Hospital. The results obtained during the period 1930-1936 were reviewed by Anglin and Brown (1). The series consisted of 89 cases, of which 67 were found to be type I and 22 type II. Of the type I cases 43 received antipneumococcus serum, and of the type II cases 15 were similarly treated. The mortality in the type I cases was 23 per cent. in the cases given serum and 42 per cent. in the untreated cases. There were no deaths among the type II cases. The details of the fatal cases, 10 in number, were presented and it was noted that, of these, 6 cases were complicated by various serious conditions; and that while the remaining 4 were uncomplicated, they received antipneumococcus serum only from the 6th to the 9th day of the disease. Reactions, either allergic, thermal, or delayed, occurred in 16 of the 58 cases which received serum. In only 4 of the 16 patients in whom reactions occurred was it necessary to discontinue treatment.

From 1936 to the present date antipneumococcus horse serum has been used less extensively and a series of cases was treated with antipneumococcus rabbit serum. While the number of cases is small in this series, it seems desirable to report them at this time, when the whole subject of the therapy of pneumococcal pneumonia is being reviewed in the light of the introduction of chemotherapy.

Selection of Cases

From July 1936 to October 1938 those cases which showed pneumococcus type I, II, V, VII and VIII in the sputum received antipneumococcus horse or rabbit serum. From October to December 1938, alternate patients in whose sputum any of these types were found received rabbit serum, the others being treated by sulphapyridine. In December 1938, serum treatment was temporarily abandoned, not because there was any doubt as to the effectiveness, but because it seemed expedient at that time to embark upon an intensive study of sulphapyridine therapy. Fifty cases constituted the group in which antipneumococcal serum therapy was employed.

Investigation

In addition to the history, physical examination, blood studies and urinalysis, blood cultures were taken on admission and thereafter as indicated. X-ray

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examinations were made when deemed necessary to confirm the diagnosis, or to indicate changes in the pulmonary lesion.

Sputum was typed according to the Neufeld method. During the season 1938-39 intraperitoneal injection of sputum into mice was used to increase the accuracy of type-determination. We have found that this method makes it possible to determine the type in 50 per cent. of instances where negative results were obtained by direct typing. The incidence of the various types during 1936 to 1939, in the 50 cases which received antipneumococcus serum, was as follows: type I, 35; type II, 8; type V, 1; type VII, 3; type VIII, 3.

During 1938 the Francis test was used to follow the course of treatment by serum. Each case was tested before any serum was given with the type-specific polysaccharide (Lederle). The test was repeated before each subsequent administration of serum. Each reading was controlled by normal saline.

PLAN OF TREATMENT

When antipneumococcus horse serum was used the patient was first carefully tested and the serum given in suitably graded doses at four-hour intervals. When rabbit serum was introduced it was found that reactions were less frequent, and milder. For this reason a modified plan of dosage was instituted. When the type of pneumococcus in the sputum had been determined, sensitivity to rabbit serum was tested as follows:

Intracutaneous injection. One-tenth cc. of the sample of serum provided for this purpose in the package of serum was injected intracutaneously on the forearm. A red wheal developing within twenty minutes was interpreted as indicating sensitivity.

Conjunctival test. One-tenth cc. of a 1:10 dilution of rabbit serum was dropped into one conjunctival sac and a comparison with the opposite side was made in twenty minutes. Sensitivity was indicated by increased redness of the conjunctiva of the eye receiving serum.

Intravenous test. One cc. of the serum to be used in treatment was diluted with 10 cc. of normal saline and injected intravenously. At the same time a record of the blood pressure was made. If a change of more than 20 points in the systolic pressure occurred, or if the pulse became accelerated 15 beats per minute during the ensuing 15 minutes, sensitivity to rabbit serum was indicated.

In this series only 2 of the 38 cases treated with rabbit serum showed positive reactions to the sensitivity tests. Four of 12 patients showed sensitivity to horse serum.

If no sensitivity was present, serum was administered. Several methods were employed. The serum was administered in doses of 50,000 units at 1 to 4 hour intervals until a satisfactory clinical response was attained; or in divided, increasing doses. The latter method was always used when there was evidence of sensitivity. A variation of the first method was employed in six of the patients, —the whole dose of 100,000 units of serum, diluted in 1000 cc. of normal saline, being given as a continuous intravenous injection over a period of 2 to 4 hours.

Serum was administered in divided, increasing doses, as previously mentioned, when there was any evidence of sensitivity. If no reaction followed an initial intravenous injection of 1/10 cc. of serum diluted in 10 cc. of normal saline, this was followed in one hour by the injection of the remainder of 1 cc. If no ill effects were observed, intravenous injections of 2 cc., 5 cc., and 10 cc., followed at hourly intervals. Four hours after the 10 cc. dose, 20,000 units (20 cc.) were given, and four hours later, 40,000 units. This dose was repeated at four-hour intervals until the desired clinical improvement resulted, unless a reaction occurred, in which event desensitization was again undertaken.

During 1936-37 antipneumococcus horse serum was employed in 9 patients.* In the winter of 1937-38, 19 patients received antipneumococcus rabbit serum and 3 received horse serum. In 1938-39, 19 cases received rabbit serum and none were treated with horse serum. During these three years there were four deaths among the 38 patients receiving rabbit serum and one death among the 12 patients receiving horse serum.

The total dose of serum for types I, VII and VIII averaged 110,000 units. For type II the average dose was 200,000 units. No set total dosage has been followed recently, but serum was given until there was a very definite clinical response. It was noticed that a drop of the temperature to normal was often not a safe indication of adequate dosage. If, in addition to this, the patient experienced a pronounced feeling of relief and well-being, further dosage was not found necessary. The Francis test was not found to be a reliable guide to the amount of serum therapy necessary.

CLINICAL PROGRESS

Following the administration of serum, the patient's temperature and pulse rate fell usually to normal within 24 hours and there was a feeling of complete relief from the distressing symptoms of toxaemia. The patient experienced what seemed to be a crisis. As in patients recovering after spontaneous crises, resolution usually required several days to be completed. When serum was used, recovery seemed to be more rapid and the number of days in hospital was reduced because of the earlier occurrence of a critical fall in temperature. The average stay in hospital of uncomplicated cases was 16 days, as compared with 24 days for similar patients who were not treated with serum. The minimum number of days in hospital was seven. A 16-year-old boy was admitted with type VIII pneumococcus in the sputum and consolidation of the right lower lobe. He received antipneumococcus rabbit serum promptly, becoming afebrile in 12 hours, and 7 days later made a long journey by train without ill-effect.

REACTIONS TO SERUM

No anaphylactic reactions were encountered. Five patients suffered chills during the administration of serum. In each of these patients the occurrence of

**All the antipneumococcus horse and rabbit serum used during the years 1936-39 was provided by the Connaught Laboratories.*

chills was followed by a fall in blood pressure, acceleration of the pulse rate, sweating, and elevation of temperature. In three of these patients no explanation of the occurrence of thermal reactions could be offered. Of the other two, one patient was a man of 75 years who had already received 50,000 units of serum and was being given a second dose of the same amount, too rapidly. The onset of the chill occurred when about 40,000 units of serum had been administered. The other patient had received 10,000 units in two minutes and experienced a severe chill, so that the injection was discontinued. The administration of serum in these patients had been made too rapidly. At least 12 minutes is required for the injecting of 50,000 units, approximately 50 cc. No fatality or any permanent ill-effects occurred. Calcium chloride was effective in controlling the chills. It was given intravenously in a dose of 10 cc. as a 10 per cent. solution.

Delayed reactions were the most common type experienced after the administration of rabbit serum. In 9 of the 38 cases treated with rabbit serum, "serum sickness" occurred, being characterized by urticaria and by aching, tender joints, lasting from one to four days. The symptoms were relieved by the use of epinephrine hydrochloride 1:1000, calcium and sedatives. Although occasioning discomfort, the condition was not serious in any of the patients.

In this series there was no evidence that there was any correlation between sensitivity as revealed in the preliminary tests and the occurrence of thermal or delayed serum reactions. Particular care was taken in the administration of serum to patients showing evidence of sensitiveness to rabbit serum and no anaphylactic or immediate reactions occurred.

COMPLICATIONS

Empyema developed in 8 patients. Six were patients who had been treated with rabbit serum. Four of the 8 required open surgical drainage and 2 died. The others recovered with aspiration treatment only. Extension of the pneumonia occurred in 3 patients, resulting fatally in 2. Delayed resolution was recorded in 5 patients but recovery followed. Positive blood cultures were obtained in 8 cases. Five of these patients recovered and 3 died. In contrast, of the 42 patients who did not have a positive blood culture, 40 recovered and 2 died. Other complications included staphylococcal skin infections (2 cases) and 1 case each of acute nephritis, cardiac irregularity, and myocardial infarction.

FATAL CASES

1. Female, age 43; lobar pneumonia; type I pneumococcus in the sputum; blood culture positive (15 colonies per cc.). Serum treatment was begun on the fourth day. A total of 90,000 units was given. Death occurred two days later. An autopsy was refused.

2. Male, age 69; lobar pneumonia; blood culture positive (type I). Serum was given on the fourth day and the patient became afebrile. He died on the eighteenth day of his illness, of myocardial infarction. An autopsy was refused.

3. Female, age 32; lobar pneumonia involving right middle and lower lobes; type I pneumococcus in sputum. Serum therapy was not begun until the sixth day of the disease and there was further spread of the pneumococcic process in spite of 200,000 units of type I antipneumococcus rabbit serum. Cardiovascular collapse ensued and a fatal termination resulted. An autopsy was refused.

4. Male, age 49; lobar pneumonia involving right lower lobe; type I pneumococcus in sputum; blood culture positive (type I). Serum therapy was begun on the fourth day of the disease and a total of 300,000 units was given. There was an extension of the disease to the opposite side, followed by the development of empyema in the right side, requiring open drainage. Abscesses from which *Staphylococcus albus* was isolated developed in the back. At autopsy the clinical diagnosis was confirmed and some degenerative changes were noted in the myocardium.

5. Female, age 51; lobar pneumonia involving completely the left side; type I pneumococcus in sputum; blood cultures repeatedly negative. A total of 175,000 units of type I rabbit serum was administered. The pneumonia did not resolve although the Francis test became positive. Marked congestive failure developed about the 18th day and was associated with phlebitis of the left leg. The patient died and an autopsy could not be obtained.

DISCUSSION

Since the mortality in this group of 50 cases was 10 per cent., it would appear that antipneumococcal serum therapy has definite value in the treatment of pneumococcal pneumonia. In a series of pneumococcal pneumonias in which the type of pneumococcus was not obtained and which were treated without serum in the same wards during the same period the mortality was 25 per cent. When one considers the type of case which resulted fatally the results appear even more favourable. The concurrence of a critical fall in temperature with the administration of serum was too frequent to be a matter of chance. The reduction of the number of days in hospital for uncomplicated cases when treated with serum, as compared with cases treated non-specifically, also indicates that serum treatment of pneumonia is of value.

In 1935 Thomas Francis Jr. (2) described a skin test using type-specific capsular polysaccharides as a means for determining when sufficient serum had been administered. There has been a considerable difference of opinion concerning the value of this procedure. Observations were made in connection with the use of antipneumococcus rabbit serum in 14 patients. In this small series the test was positive at the outset in 4 cases. It was positive after some serum had been administered in 4 patients but it was not useful as a guide because of a secondary rise in temperature. In the 6 remaining patients it was positive and corresponded with continued clinical improvement. From these few observations there was no evidence to support the adoption of this test.

Sulphapyridine therapy may supplant the serum treatment of pneumococcal pneumonias. It is less costly. It is easier to give when the drug is well tolerated

and it may also be given intravenously as a sodium salt. It is apparently effective in all types of pneumococcal pneumonia. Sufficient experience has already been obtained which indicates that in certain patients where the drug is not tolerated or where it might not be safely used, serum treatment should be employed. Furthermore, it may well be that a combination of chemotherapy with serum administration may be the method of choice. Sulphapyridine treatment can be commenced at the outset and later when sputum typing has been completed can be supplemented where indicated by the administration of rabbit serum. It may be that in this way the total amount of the drug used can be materially reduced, thus avoiding its toxic effects.

SUMMARY

This report, relating to the years 1936 to 1939, supplements the previous communication on the results of serum therapy in pneumonia. During this period 50 cases were treated with antipneumococcus serum, 38 receiving a rabbit serum. The mortality was 10 per cent. In a control group of patients in the same wards who did not receive serum the mortality rate was 25 per cent. No anaphylactic reactions occurred following the administration of serum. Before the serum was given, each patient was tested for sensitivity to rabbit or horse serum, three methods being employed, and the incidence of reactions, particularly thermal reactions, was considered to be definitely less when rabbit serum was employed. The incidence, however, of delayed serum reactions following the administration of rabbit serum was as frequent as when antipneumococcus horse serum was used. The use of serum did not appear to reduce the incidence of complications. Patients receiving serum treatment required a shorter period of hospitalization. In view of this, and of the reduced mortality, it is felt that serum treatment of pneumonia is of definite value. The limited observations made did not give evidence of the value of the Francis test as a guide in the administration of serum.

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Rehabilitation of the Mentally Ill*

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I PROPOSE in this brief discussion to bring out the salient points in the family care of mentally ill patients under the trained personnel of a mental hospital staff, as is now being undertaken in Ontario. In order to describe more clearly what we are attempting to do, it will be well to review briefly the historical background of this policy.

Historical Background

The particular aspect of mental illness on which I wish to elaborate, while quite new to the Americas and to this country in particular, had its beginning in Belgium in the sixth century. According to legend, Dymphna, the daughter of an Irish king, fled to Gheel, Belgium, to avoid the incestuous desires of her pagan father. She was overtaken and in a fit of rage was slain by her father. The body of Dymphna was buried by the inhabitants at the spot. Shortly, her grave became a shrine for those possessed of devils, and as persons mentally ill were according to the belief of the times, devil-possessed, they naturally came or were brought by relatives to visit the shrine, hoping to secure power to overcome their evil spirit, as their patron saint had done. Many, due to infirmities and the lingering desire to be helped, remained at the site, acquiring homes or living in the homes of the inhabitants. Thus the system of "boarding out" mentally ill persons was conceived. Gradually as more and more persons came from all European countries a small infirmary was erected as part of the chapel, and here new arrivals were permitted to remain a few days till they found other accommodation. From such a primitive beginning an organized system slowly took shape. Finally, in 1852 state control was established and modern psychiatric methods were applied under medical direction. Today the village and surrounding territory in which patients are boarded comprise 300 square miles with a population of 21,000, of whom approximately 3,000 are patients. There is a hundred-bed infirmary for the care of new admissions, the physically ill, and temporarily disturbed cases. Many nationalities are represented; forty-five languages or dialects may be heard spoken by patients in the colony at the present time.

The policy adopted has been that no more than two patients (of the same sex) are placed in any one home. The finding of suitable homes is no problem as there are more applicants than can be supplied with "patient-boarders". To have patients has come to be recognized as an indication of

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high standing in the community. The family that has no patients, and has never had any, is apt to be regarded with less respect. There are lower, middle, and superior class homes according to the quality of accommodation. Undoubtedly the possibility of extra remuneration has an appeal, but there is also a real desire on the part of the inhabitants to share in a great humanitarian work which has been part of the community life for centuries.

In spite of the advantages of such a system as the one described, no attempt was made to adopt the Gheel plan in any other part of the world until 1857 when a boarding-out scheme was introduced into Scotland. The Scottish system, although copied from Gheel and having the same objective, was fashioned somewhat differently. Mental patients, coming either direct from their own homes or from mental hospitals, are boarded-out in homes widely separated throughout the country. At the present time approximately 3,000 patients are being cared for in such homes in Scotland. The foster home receives 50 cents to two dollars a day for each patient.

MORE RECENT DEVELOPMENTS

During the latter part of the 19th century and during this century a growing number of other countries have instituted a program of family care for their mentally ill population, each of which is more or less similar to the Belgian or Scottish systems. France established a colony similar to Gheel in 1892. In 1911 boarding-out was instituted in Germany and over 4,000 patients are now being cared for in the community in this manner. Switzerland adopted the plan in 1909 and a number of other European countries have since instituted such a program.

The first attempt in the Americas to inaugurate a plan for the family care of mentally ill patients was made in the Commonwealth of Massachusetts in 1885 when the Scottish system was adopted. Practice in this state has always been rather conservative and at present there are roundly 350 patients being cared for in private homes in forty-four different towns and cities. This number has remained fairly stationary during the last twenty-five years. The general policy has been to board out only chronic incurable mental cases of the quiescent type where there is little likelihood of the patient's ever being capable of adjusting in the community without supervision. This is somewhat different from the Gheel colony, where chronic as well as convalescent or even alcoholic habitués are boarded out until such time as they are considered well enough to be discharged to their own homes. There are several patients in Massachusetts who have been continuously cared for in these homes for the past fifty years. About 1931 a similar arrangement was commenced in New York. It has since been adopted in a few other eastern and northern states.

ONTARIO FACILITIES

I now propose to discuss what is being done in the establishment of family care for the mentally ill in Ontario. First I should like to recount briefly what this province has been doing in the way of providing care for persons

so afflicted. The first attempt for the state to provide care for its mentally ill in Ontario was made in 1830 when the Province of Upper Canada provided care for "destitute lunatics" in a jail. In 1841 the jail on the north side of King Street between Toronto Street and Church Street in Toronto was renovated and accommodation provided for the care of seventeen mentally ill patients. In 1850 the Provincial Lunatic Asylum was built on Queen Street West. The name has since been changed to the Ontario Hospital, Toronto, and the building enlarged and modernized. Since that time the Province of Ontario has built and is now operating fourteen mental hospitals with a patient population of 14,206 as of May 31, 1939.

During the century since the establishment of these hospitals, treatment facilities have increased tremendously. In the beginning the care was custodial and the treatment mechanical restraint, such as that provided by padded cells, straight jackets, and similar iniquitous devices. The fourteen mental hospitals today are amply staffed with specialists in psychiatry, and associated with them is an army of graduate nurses, social workers, etc., all with psychiatric training. All hospitals are modern, well-conducted institutions with a maximum of treatment facilities and an organized scientific research department.

For many years, legislation in Ontario provided that any patient who had recovered sufficiently to leave hospital could be placed on probation with relatives or friends for a period up to six months. During this probationary period the patient still remained under the supervision of the hospital staff. This provision during the past two decades has been increasingly taken advantage of in that hospital superintendents have more and more encouraged relatives and friends to take on probation patients who were chronically mentally ill, but for whom continued hospital residence was unnecessary. This was really the beginning of family care for the mentally ill in Ontario but it was an expedient only and there were scientific objections to it, besides the possibilities for further development being quite limited.

Under the probation system, often patients still mentally ill were being returned to the same unsatisfactory environment in which their psychosis had developed, with a resultant exascerbation of symptoms. Likewise many suitable candidates could not be so placed outside of hospital because there were no friends or relatives to provide a home for them.

In 1933, enabling legislation was enacted whereby mentally ill patients could be boarded out in private homes at the expense of the province. This great humanitarian enterprise was commenced in a scientific unobtrusive manner by our present Deputy Minister of Health, Dr. Bernard T. McGhie. The purpose was twofold: firstly, to relieve congestion in the hospitals and to reduce capital expenditures; secondly, and of major import, to provide a more acceptable environment for those persons for whom there seemed little likelihood of a return to normal useful lives.

The Boarding-Out System

The system adopted in Ontario is fairly directly patterned after the Scottish scheme in that each hospital boards out its own patients in widely separated communities at a convenient distance from the hospital, so that adequate supervision can be maintained at all times. Many of the first homes used were the homes of members of the male attendant staff or ex-employees, but other persons in the various localities soon accepted the idea and made application for patients until now relatively few of the homes used for this purpose are connected in any other way with the hospital. At its inception the hospital paid at the rate of $4.50 a week for each indigent patient. This remuneration has since been increased to a maximum of $5.50 per week for indigent patients, depending on the type of accommodation provided. Each home is inspected by a trained social worker and its fitness decided upon by the medical staff of the hospital before a certificate of approval for the home is issued, enabling the placement of patients in it. The majority of the homes being used are in rural districts, either on farms or homes in small towns and villages. A number of city homes are also in use, the choice depending on the type of accommodation thought most desirable to meet the patient's particular needs.

The general policy has been to place patients of one sex only in a home. They are also placed according to religion, Protestants in Protestant homes only, and Roman Catholics in homes of that denomination. It has been found wise to limit each home to a maximum of four patients. We have a few homes caring for larger numbers but these are being gradually eliminated since the task tends to become a means of livelihood for the boarding-out hostess and the idea of trying to create a normal family atmosphere for the patients tends to be lost sight of entirely. The patients in the homes are visited at frequent intervals by the social worker and a staff physician.

The first patients were placed in boarding homes in 1933 and by the end of January, 1934, thirty-six patients had been successfully boarded out. This number has gradually increased until at May 31, 1939, a total of 1,477 patients had been so placed, of whom 529 are still located in such homes. It will be seen from these figures that the boarding-out population is by no means a stationary one. About one-third of the total number placed have been returned to hospital for various reasons, and about one-third have been discharged. The remainder are still in the boarding houses, many of whom in turn will eventually be discharged.

Our program of placements, while possibly somewhat conservative in numbers, is an active one. During the past six months ninety-eight new patients have been placed in boarding homes from the ten hospitals using this system. Of the total number placed, twenty patients have now been in homes for five years or more, but in spite of this the average length of stay per patient in the homes to date has been less than two years. The therapeutic advantage admittedly is tremendous and in addition it has proved to be less expensive than care on the hospital wards. The per caput cost in an approved

home, including supervision, board, and clothing, is approximately $1.00 a week less than the per caput cost in the hospital.

The policy of our placements has been, roughly, to care for two classes of patients in this way: the chronic incurable type who are harmless but require supervision; and the convalescent type who will eventually be able to resume their normal lives and can best be assisted by a gradual return to the community in a sheltered environment, as much like that to which they have been accustomed as possible, but devoid of the cares and responsibilities of their own home.

DISCUSSION

In discussing boarding-out patients, I have included a small group whose management differs slightly, but in principle is the same. This is a group of forty-eight mentally defective girls of the higher intelligence levels from our two hospitals for mental defectives, namely Orillia and Cobourg. These girls receive training in general demeanour and domestic work and are then placed in two Colony houses in Toronto, from which they are placed as domestics in homes on a remunerative basis, at first for day work only. Later, after a successful trial, they are placed in positions of their own and hospital connections are severed except for a friendly and advisory interest if they so desire.

The large majority of the patients boarded out are ones suffering from schizophrenia, as this type of care is more particularly applicable to this group and the benefits manifest are more apparent. However, a considerable number suffering from the various other psychoses are likewise placed according to the circumstances, with encouraging results. Discrimination is required in the selection to avoid persons with definite suicidal or other injurious tendencies. After nearly six years' experience with this type of care, we have no untoward incidents to report that would occasion public concern. Elopements occasionally occur, as they do from hospital wards, but they are rarely, if ever, reason for public alarm, in spite of occasional press reports tending to the sensational.

We have endeavoured to make the governing principle in the management of all boarding-out patients "free life with active and continuous medical supervision". None of the patients in the homes are required to work but most of them do so, and they are encouraged by the visiting physicians to keep active by assisting the boarding hostess with work in the home. Religious services are accessible to all through the churches of the community and many of those so inclined take advantage of this. Organized recreation and entertainment as such have not as yet been attempted and are possibly undesirable. The boarding hostesses in most instances have amply provided this in appreciation of assistance in work given by the patients and through that inherent human tendency to make life cheerful for the less fortunate. Public-spirited neighbours and friends, church and charitable organizations have interested and are continuing to interest themselves in making life more acceptable to these mentally ill persons. Such interest is encouraged and stimulated by the

hospital staff. It will be seen that great care must be exercised by the authorities to ensure that only the homes of desirable hostesses are approved and their standing in the community must be good.

Naturally the inauguration and development of such a plan as I have described meets with many obstacles. It must be started in a quiet unobtrusive way until public suspicions are sufficiently allayed to permit its expansion, as the centuries-old idea of the "raving lunatic" still haunts the public mind.

The national benefit of this system of boarding-out patients has been twofold: in addition to benefiting the patient it has thrown more light for the public on the mentally ill and their care than anything our generation has done, by revealing the mysteries the public have persistently imagined as occurring behind the doors of the mental hospital. It must not be concluded from the achievement which I have described to you that our task is complete and that a state of perfection exists. Nevertheless, from the contrast between the days of straight jackets as routine procedure for the mentally ill of less than a generation ago, and the relative freedom afforded by this treatment, it is obvious that much has been achieved. I feel that I can unequivocally recommend the procedure to other provinces in Canada, which as far as I know have not as yet adopted it.

The Kitten Test for Staphylococcus Enterotoxin

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AND
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STAPHYLOCOCCAL food poisoning has gained recognition in recent years, particularly among public health laboratory workers in North America, as a condition of widespread and relatively frequent occurrence. The symptomatology and epidemiology are very characteristic, and should by now be familiar enough to require only a brief outline. When an outbreak involving many persons occurs, the typical story is of the abrupt onset of nausea and vomiting, intestinal cramps and diarrhœa, commencing within from 1½ to 5 hours, among a high proportion of those present at a picnic or at some indoor social gathering. As a rule the attack soon passes, without sequelæ, and by the time the outbreak is under investigation, all the victims may have completely recovered. Small outbreaks involving, for instance, a few members of a family, and occasionally single cases, may also be the subject of investigation; but the symptomatology of staphylococcal food poisoning is such that reports of sporadic instances rarely reach the health authorities.

The foodstuffs most frequently associated with staphylococcal food poisoning are milk and milk products, and confections containing custard or cream fillings; but meat pies and sandwiches, sauces and dressings, and occasionally more exotic dishes, have also been incriminated. Heavy pollution with enterotoxigenic staphylococci typically causes no change in appearance, odour, or taste, but careful enquiry will usually direct suspicion towards one or two items partaken of in common by the affected persons.

Preliminary Bacteriological Examination of Suspected Foodstuff

Samples of the suspected foodstuff, if available, are collected and sent promptly to the laboratory, where a small, representative portion may be emulsified in nutrient broth. Alternatively, broth emulsions may be made from portions of each component (e.g., icing, cream filler, and cake substance). Several loopfuls from each sample emulsion are spread on to sheep blood nutrient agar plates, and the plates are examined after overnight incubation at 37°C. It is often helpful to spread additional plates using 1:10, or even 1:100,

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dilutions of the emulsion, since the growth obtained from the undiluted material is sometimes excessively heavy. By emulsifying weighed portions of the foodstuff, and by preparing poured plates with an inoculum of known volume, a rough quantitative estimate may be made of the number of micro-organisms per gram of original food substance. Samples of material suspected of causing staphylococcal food poisoning not uncommonly yield, by calculation, over one million colonies of staphylococci per gram. While much smaller numbers than this are not inconsistent with responsibility for staphylococcal food poisoning, the isolation of large numbers of staphylococci from a suspected foodstuff is a prerequisite to its incrimination on laboratory evidence. More than one strain of staphylococcus may appear on the plates, as well as other micro-organisms; but in general one strain of staphylococcus will preponderate, and may even be present in almost pure culture. The predominant strain may or may not be chromogenic, and may or may not be hæmolytic, but most enterotoxin-producing strains of staphylococci are both hæmolytic and chromogenic to some degree.

PREPARATION OF STAPHYLOCOCCUS ENTEROTOXIN

A colony of any suspected strain is picked into nutrient broth, and incubated at 37 °C. for about 5 hours. In testing strains for enterotoxin production, a soft agar medium should be used, whose nutrient base consists either of beef infusion and peptone, or of Proteose peptone. In our hands, higher potencies of enterotoxin have been given by a "semi-synthetic" medium of the following composition:

	Gms.
Difco Proteose peptone	20
Sodium chloride (NaCl)	5

Dissolve in about 500 cc. of distilled water.
To this add the following salts in aqueous solution:

	Gms.
Ammonium lactate ($C_3H_5O_3NH_4$)	5
Dipotassium hydrogen phosphate (K_2HPO_4)	1
Monopotassium dihydrogen phosphate (KH_2PO_4)	1
Magnesium sulphate ($MgSO_4$)	0.2
Calcium chloride ($CaCl_2$)	0.1

The solution is brought to the boiling point, made up to 1-litre volume, the pH adjusted to 7.4, and autoclaved at 15 pounds' pressure for 30 minutes. This forms the nutrient base, which may be converted into a medium of semi-solid consistency, when required for use, by adding 0.3 per cent. of powdered agar, followed by re-sterilization in the autoclave. The medium is poured into Petri plates, while still hot, to a depth of 0.5 to 1 cm. When cool, the surface is evenly seeded with a few drops of a 5-hour broth culture of the staphylococcus strain being tested.

The plates are stacked, and incubated at 37 °C. for 40 hours in an anærobic jar (a pressure cooker fitted with a stopcock holds more plates, and is a satisfactory substitute), into which has been introduced an atmosphere of 30 per

cent. of carbon dioxide and 70 per cent. oxygen. The whole contents of the plates are then squeezed through cheesecloth, passed through fine filter paper, and centrifuged at high speed until the supernatant is clear. This is then decanted and sterilized by Seitz filtration.

Before submitting the filtrate to the kitten test, the alpha and beta toxins must be destroyed. Of the three methods of effecting this (1), that which takes advantage of the greater heat stability of the enterotoxin is most suitable for public health laboratory purposes. A few cc. of filtrate are pipetted into a test tube, the pH adjusted to 7.0 by addition of dilute acetic acid (to avoid possible hydrolysis of the enterotoxin on heating at a higher pH), and the filtrate is placed in a boiling water bath for 20 to 30 minutes. The resulting precipitate is separated by centrifugation, and the supernatant is submitted to the kitten test.

TECHNIQUE OF THE KITTEN TEST

Kittens aged from six weeks to three months, and weighing 350-700 grams, are most satisfactory for the test, but young cats up to 1 kg. in weight may be used. Larger cats are somewhat difficult to handle, and may show some resistance to the enterotoxin. Not less than two kittens should be used for the test, one receiving 3 cc. and the other 1 cc. of filtrate, intra-abdominally. If the supply of kittens permits, another should receive, as control, 3 cc. of the original medium by the same route; or alternatively, 3 cc. of a filtrate prepared from a strain known not to produce significant amounts of enterotoxin. Filtrates should be warmed to 37°C. before injection, and should be given slowly, to avoid traumatic stimulation of the gastro-intestinal tract.

Strongly enterotoxigenic strains will evoke a positive reaction even in the kitten receiving 1 cc. of filtrate intra-abdominally, while less potent filtrates may only cause a positive reaction when 3 cc. are injected. In the typical positive reaction, the kitten displays lassitude, weakness and unsteadiness, occasionally interspersed with bouts of restlessness, commencing a few minutes after the injection. Strong peristaltic movements may be noted, which culminate, in from 15 minutes to 1½ hours, in the first of a series of attacks of retching and vomiting, which may recur over a period of an hour or more. Several loose stools may meanwhile be passed, and occasionally the diarrhœa is a more conspicuous feature than the vomiting. Passage of a single small stool shortly after the injection may be disregarded. Control kittens should of course remain unaffected.

After the paroxysmal phase is over, the kitten may appear very ill for some hours, but a rapid and complete recovery then usually sets in. Following a large dose of an exceptionally potent filtrate, the kitten may show progressive weakness, and die about 24 hours later. At autopsy such animals show none of the petechial hæmorrhages and vascular engorgement characteristic of animals dying from the effects of the alpha toxin. The gastro-intestinal tract may show an unusual amount of mucus, but no gross inflammatory changes.

COMMENTS

It should be emphasized that an outbreak of food poisoning with typical symptomatology and epidemiology, in which large numbers of staphylococci have been isolated from the suspected foodstuff, may with fair assurance be ascribed to enterotoxigenic staphylococci. A positive kitten test merely supplies specific evidence of the capacity of the strain to produce enterotoxin under laboratory conditions. When several features of the outbreak are atypical, and only a few heterogeneous staphylococci can be isolated, the cause of the outbreak is not determined by showing, with the kitten test, that one or more of such colonies are potentially enterotoxigenic. Various non-specific tests have been advocated for detecting enterotoxigenic strains, but are subject to criticism (2). When it becomes necessary to determine whether a strain isolated from the nose, throat or hands of a food handler is homologous with the strain isolated from the incriminated foodstuff, the kitten test must be supplemented by additional procedures (3, 4), which do not, however, lend themselves to ready adoption in most public health laboratories.

Some difficulties may be experienced in both securing and maintaining a supply of kittens. Once obtained (by whatever means local circumstances make most feasible) kittens should be allowed to roam at will in a dry, cool room, which must be kept very clean. If possible they should be allowed to exercise daily in the open air. A liberal diet of bread and milk, with canned cat food (containing fish and meat) twice weekly, will keep them in good condition. The same kitten may be used for several tests within a 7 to 10 day period, provided the injections be so spaced as to permit complete recovery from the preceding dose. After this time, some degree of active immunity is liable to develop, and the kittens should be discarded.

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The Contribution of the Ontario Cancer Clinics to the Control of Cancer*

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THE present interest of the Department of Health in cancer control dates from May 29, 1931, when the Government appointed a Royal Commission to enquire into and report upon various aspects of the cancer problem. In 1932 cancer treatment centres were established at the Toronto General and the Kingston General Hospitals. Early in 1934 a similar centre was established at the Victoria Hospital, London. These centres receive statutory Provincial grants and undertook to provide a stated number of beds for the treatment of cancer patients as well as satisfactory X-ray equipment. One of the duties of the director or directing personnel of each centre was the organization of a satisfactory case-recording system and social services. The details of the history and treatment and the findings of examinations made at intervals during a period of at least five years following treatment are to be recorded, on forms approved by the Minister of Health.

In 1934, additional clinics were established at the Ottawa Civic Hospital and the Hamilton General Hospital. In 1935, clinics were established at the Ottawa General Hospital and the Metropolitan General Hospital in Windsor. The Government agreed to provide these clinics with sufficient radium and the hospitals provided modern X-ray equipment. Grants are also given to these four clinics, contingent largely upon satisfactory case recording and follow-up.

Thus there are now seven cancer centres strategically located across Ontario, making available within relatively short distances the recognized and established forms of cancer therapy by X-ray and radium which cannot be satisfactorily or economically provided for in smaller decentralized units. The principle of centralized treatment units is now well established and generally approved. Each clinic is staffed by a trained radiologist as director, together with ample technical and supporting personnel. Supervising and medical consulting bodies are provided in each centre for the satisfactory conduct of administrative and professional aspects of the work of the clinics. Each clinic is equipped with ample radium and modern X-ray equipment. A 400,000 K.V. X-ray machine of most modern design, for instance, was recently installed in the Toronto clinic.

The seven Ontario Cancer Centres were organized to provide facilities for the early diagnosis of cancer, adequate facilities for the treatment of

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cancer by radiotherapy, and machinery for the follow-up of patients in the interests both of the patients themselves and of the study of cancer by clinical and statistical research.

Special emphasis has been placed on the provision of such services as these for the indigent and near-indigent groups in our population. It is agreed that fees for the treatment of cancer patients, which involves highly trained personnel and expensive equipment, should be as low as possible, having in mind the fundamental objective of establishing the clinics, namely the provision of modern facilities for cancer treatment accessible to all.

Government interest in cancer has been reflected by the expenditures in this field. To date approximately $400,000 has been spent on radium alone. The province now has 7,065 milligrams of radium distributed throughout the clinics, including the four grams in use as a "bomb" at the Institute of Radiotherapy, Toronto. In addition an emanation plant has been provided for the preparation of radon. Besides the large capital expenditure for radium, government grants are made annually to the seven centres to assist in the provision of a high standard of service and to promote clinical and statistical research. These grants amount to $86,000 a year. The total Provincial Government expenditure on cancer control up to the end of 1938 exceeded $750,000.

Cancer as a Public Health Problem

Cancer is accepted as a public health problem. Every health officer should appreciate this fact and be aware of the activities and the services the clinics provide since the prompt referring of patients for treatment is important. We have at our disposal now the means whereby the volume of sickness and death from cancer may be materially reduced. Cancer of the breast, uterus, lip, tongue, mouth and skin, certainly, are sites in which a substantial guarantee of cure can be offered if treatment is begun before local or general extension or metastasis has occurred.

In 1938, 4,589 deaths were attributed to cancer, of which 60 per cent. were among patients under the age of seventy years. At ages 20-49 years cancer was responsible for one death in every nine and ranked fourth among the chief causes of death at these ages. The crude cancer death-rate, woefully misleading at best, has been increasing steadily since records on causes of death were first available for Ontario. One-third of this increase can be accounted for by the fact that a greater proportion of our population is now alive at cancer ages. Much of the remaining increase is undoubtedly attributable to improvement in the accuracy of diagnosis and to greater detail in certification, particularly in cancers of inaccessible sites. The marked reduction in deaths ascribed to old age and ill-defined causes, which accompanied the recorded increase in cancer deaths, shows how uncertain the data are as an indication of the actual trend.

The statement that the incidence of cancer is increasing rapidly is therefore misleading. Available evidence suggests that cancer is no more prevalent at a given age now than at the opening of the century. There is no ground

for alarm, therefore, in respect to cancer incidence, but neither is there reason for complacency. There can be no doubt that from the viewpoint of the need for service, the cancer problem to-day is greater than ever before. A growing number of patients needing treatment is to be expected merely because of the changing age distribution of our population, apart entirely from any other factors.

If we apply the known data on natural duration of cancer to the recorded deaths by site, it would appear that probably not less than 7,000 cancer patients are alive and needing treatment in Ontario during a given year. It is suggested that this estimate may be much too conservative, partly due to the influence of therapy on mortality, and three to five cases per annual cancer death may be more nearly correct.

Of the male cancer deaths in 1938, 8.7 per cent. were of accessible sites and of those in females 37.4 per cent. were of such sites (breast, uterus, oral cavity and skin). For both sexes about one-quarter of all cancer deaths are of accessible sites, and these are generally recognized as amenable to treatment by radiation with or without operation. Of the patients alive and needing treatment during a given year, probably about 40 per cent. have cancer of the accessible sites. These, indeed, are the cases with which the service provided by the Ontario cancer centres is designed especially to deal.

It is recognized that there is, at the present moment, a large number of cases of cancer in this province for which we have at our disposal, even now, the means of satisfactory treatment. Our objective must be to have these patients referred for diagnosis and treatment promptly, while the disease is in its early stage.

Response to the Clinic Facilities

Interest in the work of the clinics and the service they are rendering is manifested in several ways. First, the number of new patients admitted to the clinics rose to 2,204 in 1938. Of these cases, 1,589 or approximately 75 per cent. were patients with cancers of the so-called accessible sites (breast, uterus, buccal cavity and skin). Second, during 1938 over 1,000 physicians referred one or more cases to the clinics, i.e., one physician in every four in the province referred at least one case to one of the seven centres. Third, the geographic distribution of cases is wide: cases are coming to the clinics from every county and district in the province.

So much for the favourable aspects. What of the unfavourable ones?

(1) Evidence is now available which shows that response to the present treatment facilities in those areas lying between the clinic centres is inadequate. Thus the ratio of cases treated to population (rates per 100,000) is highest in the counties where the clinics are located—Carleton 109, Frontenac 134, Wentworth 109, Middlesex 66, Essex 80 and York 52 compared with a rate of 58 for the whole province. In contrast, the case rates are low in the intermediate counties, e.g., Brant 19, Bruce 37, Elgin 40, Glengarry 40, Kent 32, Lambton 22, Norfolk 27, Oxford 37, Perth 25, Peterborough 34, Prescott 37, Waterloo 37 and Welland 31. This situation may mean: (*a*) that

the patients in these areas are being treated elsewhere and/or by other means, or that they are not receiving treatment at all, (*b*) ignorance as to the location of adequate facilities, and/or (*c*) hesitancy on the part of patients to go very far beyond their own municipality or area for treatment.

Despite what has been said about the response to the available clinic service, many patients, who might reasonably be expected to do so, are not reaching these centres. For instance, while it is estimated that there were 1,400 cases of cancer of the breast needing treatment during 1938, only 414 cases were actually admitted to the clinics (30 per cent.). Similarly, only 263 of an estimated 600 cases of cancer of the uterus were treated for the first time during 1938 at the seven cancer centres (44 per cent.). Certainly most of these cases should have radiotherapy.

(2) One important present problem in cancer control is the bringing about of treatment at an early stage. In cancers of the accessible sites, the institution of treatment before local or general spread has occurred means a substantial chance of permanent cure. It is discouraging that there appears to be little indication of the situation improving. A study covering the period 1934 to 1938 showed no improvement in the proportion of early cases admitted except in cancer of the breast, and a large proportion of all cases still come for treatment at a time when palliation is all that can be achieved. Late treatment thus persists in the face of the established fact that we have now available a means of control applicable to a large volume of cancer patients.

During 1938, excluding skin cases, only about one-third of the new patients admitted to the clinics presented themselves in the early stages when the chance of cure is greatest, i.e., before local or general extension, or metastasis, had occurred. During 1938 only one-third of the cases of cancer of the breast reached the clinics in stage 1. In cervix uteri cases the situation was even worse: only 15 per cent.—one patient in every 6—appeared for treatment while the disease was still limited to the cervix.

In all sites it is found that, on the average, public patients definitely present themselves at a later stage of disease than do private cases. This, too, is a serious problem and one to which special interest needs to be directed.

CONCLUSION

Statistical evidence of the favourable outlook in early cases places dramatic emphasis on the importance of bending every effort toward the achievement of early diagnosis and early effective treatment by recognized and approved methods. Close co-operation of the public and the medical profession is essential if the present discouraging situation is to be remedied. Many factors are involved, some of them socio-economic. Many deaths can be prevented, much sickness and suffering eliminated, if the proportion of patients with cancer of the accessible sites reaching the clinics in the early stages of the disease can be doubled. The time lapse between early and later stages of disease represents the difference between the chance of cure and mere palliation.

Ontario's seven cancer centres are well-equipped units organized to provide diagnostic and treatment facilities for all cancer patients. Every medical officer of health should familiarize himself with the essential facts regarding the centre nearest to his municipality. By realizing the situation, medical officers may be able to materially assist in directing physicians and patients alike. Sight should not be lost of the fact that probably 40 per cent. of the cases of cancer needing treatment are those of sites in which radiotherapy can offer a good deal in the direction of effective treatment. Indeed, more than one-third of cancer deaths among women are attributed to cancer of those sites particularly amenable to treatment by methods provided by the cancer clinics. There is no law requiring the reporting of cancer cases, but the co-operation of physicians is needed. As a health officer you may do much to advance the efforts which are being made to reduce the mortality from cancer.

Viability of Hemolytic Streptococci in Stock Cultures*

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STREPTOCOCCI vary greatly as to their viability on culture media. Some are easy to maintain for long periods, but many strains have very short viability in the usual media. Many other strains will live well enough if transfers are made at frequent intervals, but it is well known that repeated transfers on blood agar may result in loss of virulence.

"Frozen-dried-and-sealed" cultures provide the longest viability and the greatest retention of virulence, but the method is difficult for many laboratories, and is not suitable where many strains are to be kept easily available for reference at all times.

After finding the usual methods unsatisfactory for certain strains which he wished to study over long periods, the writer devised the following method which has given very satisfactory results.†

METHOD

Blood-Gelatin Stock Culture Medium

(1) Prepare a litre of beef-infusion broth made the usual way—500 grams lean beef, 10 grams Bacto-peptone, 5 grams salt, made up to 1 litre.

(2) Add 120 grams of Bacto gelatin.

(3) Heat and adjust reaction to pH 7.6.

(4) Sterilize in autoclave at 15 pounds for 20 minutes, then check reaction again and adjust if necessary.

(5) With all precautions to avoid contamination, dispense 9 cc. into each culture tube (we find sterile graduated Asepto syringes useful for this purpose).

(6) Add 1 cc. defibrinated rabbit's blood and mix thoroughly. We now have a 12 per cent. nutrient gelatin enriched with 10 per cent. blood, pH 7.6. Store in refrigerator.

(7) For use, prepare 18 to 24 hour cultures, best grown in beef infusion broth, pH 7.4, to which 10 per cent. of defibrinated rabbit's blood has been added. Any rich broth culture will do, however.

(8) Place the desired number of blood-gelatin tubes in the incubator until the gelatin is melted, then to each tube add 1 cc. of the above broth culture. Mix thoroughly by rolling the tube.

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†All transplants from original cultures have survived, in excellent condition, for a year or more.

(9) Add to each tube about 3 cc. of liquid petrolatum (Squibb) which has been sterilized in the autoclave. This will cover the top of the culture to a depth of about one inch.

(10) Incubate cultures at 37°C. for three hours, during which time the tubes should be mixed two or three times by rolling. Then remove from incubator, flame plugs and necks of tubes, cut off upper part of plugs and push the rest a short distance into tubes, and cork each tube with a rubber stopper which has been sterilized by boiling.

The stock cultures may now be placed in the refrigerator and left indefinitely. To make transfers from them, it is only necessary to place them in the incubator for a short while until the gelatin is melted, and withdraw the desired amount with a sterile capillary pipette.

DISCUSSION

We have found this method so easy and so dependable that we use no other. Several strains which showed poor viability by ordinary methods were easily maintained by this method. We are still using stock cultures prepared fourteen months ago, and they are as satisfactory as ever. The antigenic power has not diminished.

Sterilizing Eating Utensils by Chlorine

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IN recent years extensive investigations have been undertaken by public health authorities to determine the efficiency of various methods for the sterilization of eating utensils in public places. It is well known that the use of improperly cleansed eating utensils is an important factor in the spread of the communicable diseases in which the causative micro-organism is present in the secretions of the mouth, nose, and throat. These investigations indicated the need of greater care being exercised in the sterilization of utensils. Many health departments have given publicity to the findings. By-laws have been passed where authority was lacking, requiring proper inspection by sanitary inspectors. Where by-laws had not been strictly enforced, new efforts were made to have proper facilities provided in all restaurants and eating places for the proper sterilization of utensils. A determined effort on the part of public health officials and the co-operation of proprietors of restaurants have brought about a marked improvement in conditions in many cities. There is of course still a great need for the extension of this work.

The danger of the transmission of disease through improperly sterilized dishes has been shown by many workers. Macdonald and Freeborn(1), in reviewing the work of previous investigators, pointed out the following facts regarding the transmission of pathogenic micro-organisms in public eating places: Cummings recovered haemolytic streptococci, pneumococci, and diphtheria bacilli from tableware which he examined; Taylor showed that eating utensils used by open cases of tuberculosis carried virulent bacilli; Dearstyne found several thousand, and in some cases several hundred thousand, bacteria in hand-washed dishes; and Manheimer and Ybaney reported that in an examination of six establishments in New York using mechanical dish-washing apparatus, the plate counts on the water never exceeded 10 per cc. while the counts of those using hand methods ranged from 1,000 to 500,000 per cc.

The proper cleansing of dishes and utensils includes adequate washing, followed by a procedure which will kill all pathogenic organisms remaining on the utensils. The latter may be accomplished, as is provided in the better types of mechanical dish-washing equipment, by exposure to live steam, or by the use of compounds containing chlorine. Either treatment results in the utensils being sufficiently hot to permit of drying without the use of towels. Drying by hand towels should have no place in any system of dish washing in public places. The installation of mechanical dish-washing equipment is unfortunately not within the range of the small restaurant owner. The vast majority of eating places are small and the management will only consider a

system of dish washing which they feel they can afford. The use of two sinks, one for washing and one for rinsing, is essential. If the rinse water is to be hot enough to permit the dishes to dry without the use of a hand towel, the immersion of the dishes using a basket is the only feasible plan. The use of a good detergent in cleansing is essential, either in the form of soap or cleansing powder. Trisodium phosphate, or preferably sodium hexametaphosphate, is increasingly being used as a substitute for soap. It must be recognized also that the mere dipping of unwashed glasses in chlorine solution, as may be seen frequently at refreshment counters, is not effective; proper cleansing must first be carried out if the chlorine solution is to be effective.

The value of chlorine solution as an effective sterilizing agent was shown by a careful investigation by Mallmann and Devereux (2). They showed that chlorine solutions prepared from inorganic compounds are superior to those prepared from organic compounds containing chlorine. Stable hypochlorites in powder or liquid form are supplied by a number of commercial firms and have been found satisfactory. Several organic compounds have been developed which are also being used.

In Ontario the Department of Health has issued recommendations relating to the cleaning and disinfection of beverage glasses, stressing the use of chlorine solution.

The Department of Public Health of Peterboro carries out inspection of all restaurants, lunch rooms, and beverage rooms. This report presents the finding of a study made in eighteen establishments in Peterboro. All but three of the establishments were already equipped with double metal sinks, one compartment of which was used for washing and the other for rinsing. The temperature of the wash water varied from 95°F. to 140°F. and the temperature of the rinse water from 48°F. to 150°F. The remaining three restaurants had no facilities for rinsing. Unfortunately all used towels for drying purposes. Several conscientious proprietors had begun to use a solution of chlorine, although this was not compulsory.

Specimens of wash and rinse water and swabs from forks, spoons and tumblers were submitted to the Provincial Branch Laboratory in Peterboro for bacteriological study. The method followed in obtaining the specimens was as follows. Visits were made after the noon or evening rush period and samples were taken from utensils which were washed and ready for the customers' use. A fork, spoon and cup were taken from the racks or drawers in which they had been placed and a sterile swab was rubbed at least three times over the entire area which would come in contact with the user's mouth. The sterile swab was previously moistened with sterile distilled water. Care was taken to see that only the lower part of the swab stick which had not been contaminated with the fingers was placed in the vial. Samples of wash and rinse water were taken using sterile pipettes and placed in sterile vials. To avoid contamination the mouth of each vial was flamed prior to receiving either swab or samples of water. In the laboratory, standard methods were employed in the examination of the specimens to determine the total bacterial counts and to identify specific organisms. The extent of the bacterial con-

tamination of forks, spoons, and tumblers, as well as the bacterial content of the rinse and wash waters before the use of chlorine, is presented in table I.

TABLE I

Establishment No.		Bacteria Per Utensil			Bacteria Per C.C. Water	
		Spoon	Fork	Tumbler	Rinse	Wash
	1	30	220	130	4,200	8,200
	2	10	30	10	6,400	4,300
	3	120	110	80	1,100	3,100
	4	10	50	20	4,100	12,600
	5	3,320	100	210	500	6,200
	6	420	40	310	3,100	4,800
	7	35,000	8,400	390	47,200	265,000
	8	140	70	80	100	200
	9	90	10	10	800	3,100
	10	20	30	20	18,700	400,000
	11*	60	20	10	No rinse	200
	12*	None	60	80	100	350,000
Beverage Rooms	13	—	—	120	840	110
	14	—	—	4,500	2	550
	15	—	—	5,000	32	8,000
	16	—	—	210	90	100
	17	—	—	1,280	10,000	8,000
	18	—	—	6	10,000	7,000

*Chlorine used in wash water.

Macdonald and Freeborn state that a plate count of 100 should be a maximum for eating utensils. Using this as a standard, it is evident that over half the restaurants were not properly sterilizing the utensils. The presence of intestinal bacteria of the colon-aerogenes group, diphtheroids, and streptococci in 90 per cent. of specimens is further proof of the unsatisfactory cleansing that existed at the time of the preliminary investigation.

Since the temperature of the rinse waters was too low to be effective, it was felt that the use of chlorine solution would accomplish the necessary disinfection. A concentration of chlorine of 100 parts per million was proposed. Although towels were not prohibited, it was required that they be sterilized before use. Considerable time was given to educating those concerned in the use of the chlorine solution. The three restaurants which did not have double sinks were required to install them. Periodical checks were made of the restaurants to determine if the chlorine used in the rinse water was of sufficient strength. The co-operation of the proprietors was very gratifying.

When the use of chlorine as a disinfectant had been introduced and was being used regularly in all the restaurants a second series of bacteriological examinations was made of utensils and of wash and rinse waters. The results obtained fully justified the labour expended (table II).

A comparison of tables I and II shows the improved sanitary condition of utensils in eating houses after the use of chlorine. The total number of organisms per utensil before the use of chlorine ranged from 10 to 35,000. The total number per cc. of wash water ranged from 100 to 400,000 while that of the rinse water was from 2 to 47,000. After chemical sterilization had been in use for several months the count per utensil was in all but one case below 100 and in many instances no organisms were found. Similarly,

TABLE II

Establishment No.		Bacteria Per Utensil			Bacteria Per C.C. Water	
		Spoon	Fork	Tumbler	Rinse	Wash
	1	2	4	3	223	4,500
	2	1	2	2	35	810
	3	None	6	None	2	5
	4	2	4	4	284	1,800
	5	None	2	None	4	140
	6	115	6	3	2	Too numerous
	7	76	85	3	2	750
	8	None	None	2	9	27
	9	1	None	2	10	None
	10	9	3	4	1	395
	11	None	2	5	No rinse	6
	12	None	4	5	2,500	6,000
Beverage Rooms	13	—	—	2	3	3
	14	—	—	45	4	2
	15	—	—	3	1	5
	16	—	—	36	550	None
	17	—	—	2	1	3
	18	—	—	3	4	None

only four specimens of wash water and one specimen of rinse water exceeded 1,000. Not only were the total plate counts reduced to a minimum but organisms of intestinal origin and other pathogens were eliminated. In not a single instance were colon bacilli found either on utensils sterilized in chlorine or in specimens of the water in which they were rinsed.

In the second survey the range of temperatures of wash water and rinse water was the same as that in the first survey. Temperatures are therefore excluded from this report as not being significant.

Conclusion

1. The addition of chlorine to the rinse water is a satisfactory method for sterilization of eating utensils.
2. The use of chlorine solution is recommended for the small restaurant because it is simple and inexpensive.

Acknowledgment

The writer is indebted to Dr. C. B. Waite, director, and Mr. H. Kelsey, technician, of the Provincial Branch Laboratory, who conducted the bateriological analysis of all samples submitted, and to Dr. G. Murray Fraser, Medical Officer of Health, for his active interest in this work.

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(1) R. St. J. Macdonald and Grace M. Freeborn: Sterilization of Eating Utensils, Canad. Pub. Health J., 1933, *24*: 83.
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THE DISTRIBUTION OF MEDICAL CARE AND PUBLIC HEALTH SERVICES IN CANADA

THERE has been a manifest lack of accurate data as to the extent and adequacy of public health machinery and provision for medical care in Canada. Some three years ago the National Committee for Mental Hygiene initiated a study designed to meet this lack. The study report has just been published.

The report deals in adequate detail with the distribution and extent of health services, and the apparent adequacy of the available medical care in terms of both accepted standards and mortality statistics. It evidences the fact that the mortality hazards from certain of the major causes of death are appreciably greater in certain sections than in others. Unfortunately, owing to the lack of morbidity data for other than communicable diseases it is not possible to establish conclusively whether the existing conditions are due to inadequate medical care or the lack of a sound preventive program. It does attempt, however, to correlate cause and effect to the point that the informed reader can draw his own inference. Whether such inferences will be sound in the light of the information available is on occasion open to question. For example, after establishing that the maternal death rate in Canada is appreciably higher than it should be, it permits the inference that this is primarily due to the unavailability of adequate medical care. On the other hand it presumes that there is an indissoluble tie between the number of available sanatoria beds and the mortality from tuberculosis. Yet in Nova Scotia, according to the figures presented (see pages 8 and 87 of the report) the death rate from tuberculosis is nearly three times that of Saskatchewan, despite the fact that the ratio of sanatoria beds to population is almost identical.

The study demonstrates that there is a wide discrepancy in respect to the scope of the preventive services rendered in what would appear to be more or less comparable areas, both in the matter of policy and expenditures, and establishes that, having given due consideration to the significance of certain indigenous factors, the rather hackneyed expression to the effect that good health is as purchasable as other commodities, is reasonably well founded.

The bulk of the report is devoted to an attempt to demonstrate the need for a more equable distribution of medical, dental, nursing and hospital care. This

is apparently justified by the presumption that the survey committee is satisfied that while there is a general acceptance of the principle that an official interest in the control of preventable illness is a prerogative of the state or community, there is as yet no evident enthusiasm to the point where governments shall officially interest themselves in all things which adversely affect the health of the public. An effort is therefore rightly made to focus the reader's interest on the inadequacies in treatment facilities throughout the country.

Evidence is submitted which precludes any casual disposition of the question by those medical casuists who presume to speak with authority on such matters. It is noted that 25 per cent. of the Canadian people live in families where the family income is less than $950 per year. It is evident that the family in general is unable to pay medical fees and the other associated costs of illness, on such an income, without depriving the members of the family of other necessities.

The cost of medical and allied services is listed as $181,000,000 or $18 per person, and $12,000,000 is said to be spent on public health including sanitation. While difficulty presents in any attempt to draw a fine line of distinction between preventive and curative service, it may be accepted that the inadequacies of a preventive program will be reflected in the increased demand for treatment; therefore the first logical step is to establish beyond criticism those services which are fundamentally preventive and having done so, evolve a scheme which will ensure a reasonable minimum of medical care to all of the people with due provision for payment of such services.

The committee have given due prominence to all of the schemes for contributory medical care which have as yet been implemented by concerned groups in the various provinces. Some of these, e.g., the municipal-physician system, are in the main applicable only in the area in which they have been set up or in comparable communities in other provinces. Some are based on the attempt of governments to provide indigent medical care. Others are extensions of previously existing schemes provided by industry; while others are an attempt by organized medicine to supply a recognized need. Most of these are based on the principle of compulsory participation. References in the report deal with the experience of other countries in the provision of organized medical care. A number of relevant appendices are included.

The accuracy of the information contained in the report can be accepted. The conclusions are reasonable and the recommendations are worthy of serious consideration on the part of those responsibly placed. The conclusions and recommendations of the report are presented in full on page 86 of this issue.

PROGRESS IN MENTAL HYGIENE

GAINS in public health are not limited to those which can be measured objectively. Were this not so, progress in the care of the mentally ill and achievements in mental hygiene must surely be insignificant. On the contrary, a great deal has been accomplished both in the care of persons with manifest mental disorder and in the field of rehabilitation and control.

In the institutional treatment of psychotic, mentally defective, and epileptic patients, a significant gain has been the changed concept of mental disorder symbolized by the substitution of the term hospital for institution or asylum, and the use of the phrase mental illness or disorder rather than insanity.

The development of systems of boarding patients in approved homes in the community, described in a paper by Dr. C. A. Buck in this issue, is an important progressive step. The plan, although well known in Europe, was introduced in Canada in 1933 in Ontario. During the following year thirty-six patients had been successfully boarded out. That the plan is practical and has many advantages is evidenced by the fact that the number has gradually increased so that a total of more than 1500 patients have received such care. At the present time more than 500 are located in approved homes. That such a plan is possible is evidence of the change of outlook of our communities in regard to mental illness. The experience in Ontario is such that the procedure can be recommended for adoption by other provinces.

THE IMPORTANCE OF PLUMBING INSPECTION

FOR many years medical officers of health were inclined to consider that the inspection of plumbing was not a matter of primary concern to health departments. In a number of cities plumbing inspection was placed under the supervision of other departments of the municipal government. The findings of the investigation of the epidemic of amoebic dysentery in Chicago in 1936, focusing attention upon the danger of cross-connections and defective plumbing installations, have led to new attention being paid to this subject. In various cities surveys have been made of the extent of cross-connections, particularly in industrial plants. Such a study was made by René Cyr of the Department of Health of Montreal in 1932. One of the most recent surveys relates to a thorough investigation of the plumbing in 651 hotels in San Francisco.[1] Of this number, 82 were found to have one or more serious plumbing hazards. The defects found most frequently were fixtures with submerged inlets and dangerous connections which would permit, under certain conditions, of the contamination, with sewage, of water used for drinking. It is evident that there is urgent need for continuous and efficient inspection of all plumbing. Rigid inspection of plumbing installations is of first importance but this must be supplemented, particularly in hotels and apartment houses, where frequent changes in plumbing arrangements are made.

A remarkable demonstration of the occurrence of siphonage followed by a serious outbreak of infection was recently recorded in Michigan State College, where eighty cases of infection with *Brucella melitensis* occurred.[2] This infection, so unusual in its transmission through water, was the subject of careful enquiry. Examination of the plumbing indicated that the infection had occurred through improper sterilization of cultures of this organism and faulty plumbing.

[1]Geiger, J. C., Am. J. Pub. Health, 1939, **29**: 927.
[2]Newitt, A. W., Am. J. Pub. Health, 1939, **29**: 739.

PUBLIC HEALTH ADMINISTRATION

THE DISTRIBUTION OF MEDICAL CARE AND PUBLIC HEALTH SERVICES IN CANADA

THE report of the study of the distribution of medical care and public health services in Canada, conducted during the past three years by the National Committee for Mental Hygiene (Canada), was issued in January. The study was conducted by the Hon. George Hoadley and Dr. Grant Fleming, representing the Committee's Division on Public Health and Medical Services. The report constitutes a volume of 184 pages and the findings are presented in eight chapters with an appendix containing memoranda pertinent to the scope of the study. Copies of the report may be obtained from the office of the Committee, 111 St. George Street, Toronto. Because of their general interest, the conclusions and recommendations are presented herewith.

A. Conclusions

The purpose of this study, as indicated in the foreword, has been to assemble available facts so that there would be presented an approximate picture of medical care and public health services in Canada. In the absence of complete records of medical facilities and of comprehensive surveys to show the percentage of the public who fail to secure medical care, together with the reasons for this failure, it has been impossible to furnish a full and detailed account in these respects. Sufficient evidence has been set forth, however, to warrant some general conclusions.

I. Distribution of Medical Facilities

(a) Canada is served by 55,513 health personnel, including 10,031 physicians and surgeons, 4039 dentists and 20,474 graduate nurses. To insure adequate medical and dental services, there would be needed, according to the standards formulated by the United States Committee on the Costs of Medical Care, an additional 4769 physicians and 6323 more dentists (table 1A, page 5).

(b) The ratio of total health personnel to population varies from 1:136 in British Columbia to 1:305 in Saskatchewan (table III, page 6). There is a concentration of health workers in the larger centres of population. Apparently, the distribution of physicians, dentists and nurses is determined more by opportunities to gain a livelihood than by actual medical needs.

(c) There is a shortage of 3500 sanatoria beds for the treatment of tuberculosis, with the Province of Quebec and the Maritime Provinces in greatest need of additional accommodation (page 78).

(d) Mental hospital accommodation in the Dominion falls short of requirements by 8657 beds (page 79).

(e) Visiting nursing services reach only 79 out of 301 Canadian cities and towns, together with 10 semi-rural areas (1938). (Page 79.)

(f) Needed medical care is not always received by Canadians as is clearly evidenced by a relatively high infant mortality rate, maternal mortality rate (table XII, page 85), deaths from syphilis and appendicitis (table XIX, page 92), and failure to obtain nursing care in the home as required (page 74). Failure to secure medical

care when it is needed may be due to ignorance, indifference, inaccessibility, or inability to pay for service.

(g) The cost of health services (medical care and public health, 1931) was $193,751,913, or approximately $19.00 per person. In connection with this cost, private individuals contributed 72 per cent., governments 21 per cent., and others (industry and philanthropy) 7 per cent. (page 4).

(h) Approximately 25 per cent. of Canadian people are medically indigent in the sense that they are incapable economically of defraying the costs of necessary medical care (page 71).

(i) There are many families in Canada with low incomes who cannot be considered medically indigent because of their ability to pay small medical bills, but who are unable nevertheless to meet the costs of severe or prolonged illnesses (page 73).

(j) There is no evidence to show that any considerable group in Canada has been denied medical care if such attention has been sought. A substantial body of facts has been collected to indicate that a great deal of care is given gratuitously by medical practitioners and institutions. However, many Canadians do not secure medical attention when it is needed because of the economic factor. This statement is supported by the fact that the proportion of children with diagnosed physical defects in one large Canadian city receiving immediate medical treatment was markedly lower after the depression than before 1929-1930 (page 73). It was also reported by the medical profession in an Ontario city that the average volume of practice in 1932, as compared with 1929, was 63.5 per cent. (page 75).

(k) Studies conducted in Montreal indicate higher rates in reference to certain disabilities among the unemployed as compared to an employed group (page 95). This finding is in line with facts collected in the United States that demonstrate higher illness rates among the poor as compared with the well-to-do.

II. Distribution of Public Health Services

(a) Canadian cities, in general, have been slow to utilize preventive measures in safeguarding health. The inadequacy of existing services in cities is shown by an average expenditure of 51 cents per person by municipal departments of health (page 82), whereas a satisfactory service requires a minimum of $1.00 per person and more than $2.00 per person for a complete well-balanced public health program.

(b) Aside from the Province of Quebec, Canada has been backward in developing full-time rural health units. Organization along this line, modified to suit local conditions, is accepted as essential for the provision of adequate public health services.

(c) Facts have been presented in this study to indicate relatively high morbidity and mortality rates for certain areas which could be reduced through the provision of strengthened public health programs. This statement holds particularly true in reference to infant mortality, tuberculosis, venereal disease, and to water and milk-borne diseases (table XIV, page 87, and table XIX, page 92).

B. RECOMMENDATIONS

I. Medical Care Services

In view of the fact that medical care is unevenly distributed throughout Canada, together with the circumstance that so many citizens in the lower income brackets are unable to meet the costs of necessary medical attention, it would be highly desirable to foster developments in the direction of co-operative plans for medical, nursing, dental and hospitalization services. Such arrangements should be organized to spread the costs and so facilitate, as far as possible, adequate medical attention to every Canadian, regardless of his economic status.

Responsibility for the medical care of those dependent on the state, such as the unemployed, old-age pensioners and recipients of mothers' allowances, should be assumed by the appropriate governmental authorities.

While it is possible that Canada may eventually reach the stage when a federal scheme for medical care and public health services will be considered desirable, nevertheless, experience will be requisite in meeting the varied needs throughout the country as a forerunner to national planning—experience to be gained by local and provincial initiative and finance.

The following recommendations relate to (a) rural areas, (b) urban areas and (c) hospitalization:

(*a*) *Rural Areas:*

Immediate progress in the provision of adequate medical care services can be fostered for the considerable percentage of Canadians residing in rural areas by extending and improving the Municipal Physician scheme. Experience in Western Canada, particularly Saskatchewan and Manitoba, has demonstrated the practicability and advantages of this means of furnishing the services of general practitioners for rural municipal districts, with costs met through local taxation. Somewhat similar arrangements in the Highlands and Islands of Scotland also have proved their worth.

The effectiveness of municipal physicians can be greatly enhanced through the coordinate development, in rural areas, of local hospitals with approximately 50-bed capacity to serve population units of 20,000. Modern medicine necessitates hospital facilities as an adjunct to medical practice. Each hospital would provide an office for the local health department which would serve the same population as the hospital itself.

In such a plan, specialists' services and visiting nursing care would be developed. Municipal physicians would practice both therapeutic and preventive medicine as is the case in Saskatchewan and Manitoba. Provincial legislation is essential, of course, to control, through the Provincial Department of Health, the type of contracts entered into by the local areas, and to make arrangements for the supervision of services and the refereeing of disputes.

The services of municipal physicians would be supported, as has been indicated, out of local taxes, but if it is beyond the economic capacity of the local area to meet all the costs of supplementary facilities and services (hospitals, specialists' services, and home nursing), then support might be provided from other official sources as is the practice in the Highlands and Islands of Scotland.

(*b*) *Urban Areas:*

Since there has been no experience in Canada in providing medical services on a cooperative basis in urban areas for low income groups, aside from industrial projects, it is suggested that municipal authorities, in conjunction with provincial departments of health, explore possibilities in this regard. Valuable leads may be furnished by studies of voluntary plans in Canada, of proposed schemes in British Columbia and Alberta, and of arrangements in Great Britain (chapters IV and VI).

There is an unquestioned need for a number of experimental demonstrations to gain a background of experience. It was through local experience in Saskatchewan in the employment of municipal physicians that planning for rural areas has been made possible. Through pioneering local efforts in cities, there will probably emerge workable systems that may serve as guides for widespread application.

(*c*) *Hospitalization:*

Because of the demonstration in Canada and the United States of the practicability and value of voluntary

pre-payment plans for hospitalization, it is desirable to extend such group arrangements throughout the country. New projects might well be developed in accordance with standards that have been formulated by the American Hospital Association. It would be unfortunate to embark upon schemes that are not actuarially sound or that violate basic principles.

II. Public Health Services

The first requisite to insure effective public health services is the organization of full-time local units with trained staffs and adequate budgets. The chief objective, therefore, in public health, should be the securing of this type of organization for all parts of the Dominion, rural and urban.

As far as urban areas are concerned, standards for effective public health organization are well established. In rural areas, general principles have been accepted, but considerable flexibility is required in applying these principles to each particular area. For example, in districts where there are municipal physicians, these officers should be incorporated into the public health scheme to render preventive services to individuals and families, but, in addition, there are needed community services, such as epidemiology and sanitation of the environment, which must be provided by the trained staff of a health department.

Other recommendations are:

(a) The furnishing of financial assistance through provincial departments of health to such local areas where, because of economic conditions, it is impossible locally to finance a health department.

(b) The incorporation, into Provincial Health Acts and Regulations, of qualifications for the various types of health workers as is now the case in Manitoba and in England and Wales, to eliminate the appointment of untrained applicants.

(c) Although the chief responsibility for public health rests with local authorities and provincial governments, the Federal government can make a valuable contribution to public health progress through the formulation of standards, the furnishing of consultation services, and the provision of grants-in-aid when necessary.

A SURVEY OF THE HEARING PROBLEM IN AN URBAN SCHOOL AREA

IN November, 1938, the Hard-of-Hearing Club of Victoria offered to provide equipment for the hard-of-hearing children, should there be a need for such assistance. As a preliminary, a study was made to determine the number and distribution of children with a hearing difficulty, and the degree of disability. From an analysis of the available health records, it was found that only 28 of the 5000 school children in the area had shown hearing rated "poor" in both ears, after all possible correction of defects had been obtained. These findings were based on the use of routine tests, viz., the use of the watch tick, whispered voice, and spoken voice of varying intensity.

With the co-operation of Mr. C. E. McDonald, Principal of the Provincial School for the Deaf and Blind, a special study was made of these 28 children, using a Western Electric 6A Audiometer, testing the hearing at the various frequencies corresponding to the spoken voice. Before undertaking the tests, these children and their parents were invited to a meeting at which the purpose and the nature of the test were discussed and a talk given on the management of hearing problems. The parents showed a keen interest, and an appreciation of the

opportunity for the examination of the hearing of their children.

Since the Victoria school system comprises 14 relatively small schools, a Junior High and a High School, it was found desirable to bring all the hard-of-hearing children to the Central Health Office for examination. The test for each child required about half an hour where hearing difficulties were encountered, and much less where the hearing was more nearly normal.

The results of the tests carried out are given in the following table:

Decibels Loss in the better ear	*Recommendation*	*Number*
0—10	Adequate hearing in at least one ear. Not at present a hearing problem.	13
10—20	Require consideration in seating and further observation.	8
20—40	Lip-reading indicated to supplement hearing.	1
40—60	Lip-reading advised and a hearing aid if available.	5
60—90	Recommended for admission to the Provincial School for the Deaf.	1
	Total	28

It was interesting to find that of the cases considered "hard-of-hearing" at the last routine examination, almost half were shown by the audiometer test to require no special consideration at the present time. A few children could hear the audiometer at frequencies corresponding to the human voice but could not hear the tick of a watch.

The seven children having serious hearing disability were in different schools and grades, and it was felt that the problem was an individual one and not one to be met by the use of a group hearing aid. These children were all been referred, through their parents, to a special lip-reading class at night school, and the findings of their hearing test discussed with the family physician.

While this survey covers only a small number of children, it suggests a means of studying hearing problems in both urban and rural school populations. Had the means been available, a more satisfactory method would have been to test all children suspected of hearing difficulty with the group audiometer. This could then have been followed with the individual test where such was indicated. In this way, half of the pupils in this series could have been eliminated and the completion of the examination in one day made possible.

The satisfaction expressed at the results of our small study would suggest the wider use of the audiometer in testing the hearing of school children, particularly those having known or suspected hearing difficulties. A provincial health department could extend real assistance in such field studies by providing a group audiometer, an audiometer for conducting individual tests, and someone familiar with their use. Such an individual could act as a consultant to the school medical officers and a very useful service would be made available for local health officers in their work with school children.—*J. L. Murray Anderson, M.D., D.P.H., School Health Inspector, Victoria, B.C.*

AN INSPECTOR LOOKS AT THE RESTAURANT PROBLEM

AN editorial in a midwestern local newspaper dealt with the subject of eating places in the city in which the paper was published. The language was strong, but if what the writer said was true, it probably was justified. He referred to one restaurant as smelling like a fur-trapper's cabin after a long winter, and stated that the food served would give an

ostrich indigestion. He laid the blame at the door of the local health department. Never having visited that city, I cannot pass judgment, but I feel sure that in practically every province in Canada restaurants are operating which should never have been granted a permit.

No man would tolerate a slovenly maid in his household handling and preparing the food for his family. The person who is compelled to eat in restaurants is not in this position. He must depend on the sanitary inspector to keep a watchful eye over things. Should not the local health department give him information that will guide him in selecting a restaurant?

The answer, as I see it, lies in a proper system of grading restaurants.

There are four recognized methods of grading. While none of these is perfect, each has something to recommend it.

The system commonly in use is that by which the eating-house either is approved or is not approved. There are real difficulties in this system because from time to time pressure will be brought to bear on the sanitary inspector to give approval not warranted by circumstances. Any of the other three systems is to be preferred. These are based on scoring the various features of a restaurant and grading it accordingly.

In the second system a score sheet is used whereon the various features are listed. To the right of the sheet are three columns headed GOOD, FAIR, and POOR or UNSATISFACTORY. In his examination the inspector places check marks in the various columns recording his grading. There is often room for debate as to whether some item should be scored fair or poor, and it is also true that two inspectors may differ in their appraisal of the same premises.

The third system, which originated in Ann Arbor, Michigan, is an improvement on the above. The rating schedule contains only two columns to the right of the page, opposite the items to be inspected. One contains the perfect score and the other, deductions. In this scheme, the inspector makes his visit in company with the proprietor or manager. As the various items are covered, deductions are made or full score allowed in accordance with the findings. Thus, if in the kitchen the inspector finds the bus-boy washing dishes in a tub of lukewarm water of the consistency of soup, he might say to the proprietor, "That is bad, Mr. Smith. I'll have to take off three points for that. You know that the water should be clean and the temperature 180 degrees." When the inspection is completed, the sanitary inspector deducts the points which he has entered in the right-hand column from the possible total of 100 points. If the final score is above 90, a "Restaurant A" card is posted; if between 80 and 90, a "B" card; and if from 70 to 80, a "C" card.

The fourth system is that developed by the United States Public Health Service. This system is in use throughout the state of Indiana, as well as in many cities throughout the United States. It presupposes that all restaurants are class A. Every minute detail is listed, with a set of brackets after each. If the inspector finds any item not up to the standard, he places a cross in the bracket. The items are arranged in groups and after each group is a symbol (B) or (C). This means that if the restaurant falls short of the standard for any item in the group, it automatically drops to grade B or C. In my opinion this inspection form is better than the others. It entails a most thorough inspection. At least half an hour is required in order to cover everything. At the same time, this method of grading is too drastic. Take, for example, the first group of items, which reads:

Floors. All easily cleanable material, good repair ( ), *clean* ( ), *kitchen* ( ), *impervious surface* ( ).

The inspector might arrive just after

the rush period when naturally the kitchen would be upset and the floors might not be clean. Hence what might ordinarily be a class A restaurant would be graded as class B. Going further down the list, he might look at the wash-room and find that the supply of paper towels had been exhausted. Accordingly the restaurant would be classed as grade C.

As stated earlier, none of these systems is perfect; yet surely out of the four a workable system of grading, satisfactory to the inspector and the restaurateur and helpful to the public could be evolved.

There is another viewpoint which must be considered. There are different grades of society patronizing the restaurants, and different restaurants cater to these different groups. Is it fair to frame an ordinance with only one set of standards to cover all eating places? I have looked over a number of food ordinances and cannot find one in which any distinction is made. The Chateau Frontenac is a restaurant and the "Greasy Spoon" down by the docks is also a restaurant. Is it right to give the same kind of a class A card to both? I would suggest that a standard ordinance be framed in which restaurants and lunch rooms would be clearly defined. With this basis, I think that the supervision of eating places could be handled with a great deal more satisfaction to everyone concerned.—*T. Gordon Miller, C.S.I.(C.), Chief Quarantine Inspector, Local Board of Health, Windsor, Ontario.*

HOUSING

THE FIRST CENSUS OF HOUSING IN THE UNITED STATES

THE first housing census in the United States, shortly to be undertaken, will be of considerable importance not only in that country but also in Canada. The 1931 Canadian census did provide a good deal of data on housing, rentals, values, etc., but nothing quite so extensive as planned by the United States Census Bureau has been attempted before.

A comprehensive picture of housing and home ownership will be compiled from the information to be gathered by the 120,000 census enumerators in conjunction with the sixteenth decennial census to be conducted in April of this year. Through the use of a special schedule comprising thirty-one questions bearing on the type of structure, equipment, and ownership, data will be obtained for each of the approximately 35,000,000 dwellings throughout the country. In the preparation of the questions included in the housing schedule, census officials secured the aid of trade associations, financial groups, and research organizations. In this way the inclusion of those questions which will gather the greatest possible amount of useful information is assured.

The questions to be asked by the enumerators in connection with the housing phase of the census have been tentatively set up as follows:

1. *Characteristics of structure in which dwelling unit is located:*
   Type of structure: One-family detached, one-family attached, two-family side-by-side, other two-family, three-or-more family structures and structures with business by number of dwelling units.
   Structure originally built as: Residential structure with same number of dwelling units, with different number of dwelling units; non-residential structure.
   Exterior material: Wood, brick, stucco, other.
   Is this structure in need of major repairs?
   Year structure was originally built.
   Located on a farm?

2. *Characteristics of dwelling unit:*
   - Number of rooms.
   - Water supply: In dwelling unit—running water, hand pump; within 50 feet of dwelling unit—running water, other.
   - Toilet facilities: In structure—flush toilet for exclusive use, shared flush toilet, other; outside toilet or privy.
   - Bathtub or shower with running water in structure: For exclusive use; shared with other households.
   - Lighting equipment: Electric, gas, kerosene or gasoline, other.
   - Estimated rental value of owner-occupied or vacant non-farm dwelling.
   - Occupancy status of vacant dwelling: For sale or rent—ordinary dwelling, seasonal dwelling; held for absent household—ordinary dwelling, seasonal dwelling.

3. *Characteristics of occupied dwelling unit:*
   - Home tenure: Owned, rented.
   - Colour or race of head of household.
   - Total number of persons in household.
   - Refrigeration equipment: Mechanical, ice, other.
   - Is there a radio in this dwelling?
   - Heating equipment: Central steam or hot water, piped warm air, pipeless warm air, heating stove.
   - Fuel for heating: Gas, coal or coke, wood, fuel oil, kerosene or gasoline, other.
   - Fuel for cooking: Electricity, gas, coal or coke, wood, kerosene or gasoline, other.
   - Monthly rental of renter-occupied dwelling.
   - Rental value without furniture of renter-occupied non-farm dwelling with use of furniture included in rent.
   - Cost of utilities and fuel paid for by non-farm renter in addition to monthly rental.
   - Value of owner-occupied home.
   - If owner-occupied non-farm, is property mortgaged?

4. *Mortgage characteristics of owner-occupied non-farm 1 to 4 family structure:*
   - Present amount of outstanding indebtedness on first mortgage or land contract; on junior liens.
   - Frequency and amount of regular payments on first mortgage or land contract.
   - Do these regular payments include principal reduction?
   - Real estate taxes?
   - Interest rate on first mortgage or land contract?
   - Type of holder of first mortgage or land contract: Building and loan association, commercial bank, savings bank, life insurance company, mortgage company, Home Owners' Loan Corporation, individual, other.

The information secured will be of inestimable value in the determination of future housing policies, and of special interest to manufacturers, builders, and bankers in their study of trends in home ownership and building in the United States. From the tabulations to be made by census authorities it will be possible to determine facts of vital importance to local municipalities and subdivisions. For example, cities will be able to determine the distribution of the various types of housing within their limits, the possible need for expansion of transportation and communication systems, police and fire protection, schools, and similar facilities.

The scope of application of the tremendous volume of information which will be forthcoming is almost unlimited. The statistical tables made available will be of great practical use to social workers in establishing relationships between certain types of housing and human needs by correlating their own data on characteristics and location of clients with the census information. Data on the equipment in and the state of repair of homes will be useful to manufacturers and distributors of housing products in the planning of their sales campaigns on a factual basis. Home finance institutions will find the mortgage data of value in assessing the soundness of their investments and the possibility of mortgage expansion.

The official reports upon the findings of this nation-wide housing survey will be awaited with keen interest. A growing consciousness of the need for action in this field and, more important, for the setting up of housing standards and the development of constructive national and local housing policies, makes this undertaking one of special significance in the march of public health on this continent.

CORRESPONDENCE

NOMENCLATURE OF BLOOD GROUPS

AT a recent meeting of the Health Committee of the League of Nations, attention was drawn to the fact that, although the new international nomenclature of blood groups had been almost universally accepted, articles were still appearing from time to time in medical journals in which one or other of the older nomenclatures was used. At a time when there is a likelihood of large extension of blood transfusion, it was felt that all possibility of error due to confusion in nomenclature should be avoided. Dr. Neville M. Goodman accordingly was authorized, as the British member of the Health Committee of the League, to send a letter to the editors of the leading medical and legal journals in Great Britain and the Colonies.

The JOURNAL has pleasure in publishing Dr. Goodman's letter setting forth the approved nomenclature.

Ministry of Health,
Whitehall, S.W.I.
9th January, 1940.

Dear Sir,

Nomenclature of Blood Groups.

As the British member of the Health Committee of the League of Nations, I have been asked to draw your attention to the following resolution passed at the meeting of this Committee on November 20th-25th, 1939:

> "The Health Committee believes it to be its duty once more to draw the attention of all concerned to the recommendation adopted by the Permanent Commission on Biological Standardisation in 1928 concerning the nomenclature to be adopted in the designation of blood groups. It is of opinion that, especially in present circumstances, the use of a uniform nomenclature will obviate mistakes which might entail serious consequences."

In 1928, the Permanent Commission on Biological Standardisation reported that:

> "The Commission learns with satisfaction that, on the initiative of the Health Organisation of the League of Nations, the nomenclature proposed by von Dungern and Hirszfeld for the classification of blood groups has been generally accepted, and recommends that this nomenclature shall be adopted for international use, as follows:
>
> O A B AB
>
> "To facilitate the change from the nomenclature hitherto employed, the following is suggested:
>
> | | | | | |
> |---|---|---|---|---|
> | Jansky | O(I) | A(II) | B(III) | AB(IV) |
> | Moss | O(IV) | A(II) | B(III) | AB(I) |
>
> "The Commission recommends the adoption of the following method of designating test-sera:
>
> Test-serum A (anti-B),
> Test-serum B (anti-A).
>
> Test-serum A (anti-B) should be placed in containers of white glass, test-serum B (anti-A) in containers of brown glass.
>
> "The Commission having learned that in certain countries this nomenclature was not yet in current use, emphasised the importance of achieving uniformity in the matter. The Commission believes that this object might be attained:
>
> (a) if each Institute which supplies standard sera used solely this nomenclature,

(b) if the editors of scientific journals (medical, legal, etc.) insisted upon the exclusive use of this nomenclature in all the works they may be called upon to publish. It is particularly desirable that all the more important weekly medical journals should also conform to this rule."

The attention of the Health Committee had been drawn to the question by the Danish member, who stated that authoritative British medical journals had recently published articles in which the old nomenclature had been used.

Yours faithfully,

NEVILLE M. GOODMAN.

In Canada the matter has already received attention through the Sub-committee on Blood Storage of the Associate Committee on Medical Research of the National Research Council. At a meeting of the Sub-committee on December 2nd a resolution was passed adopting the international nomenclature for use in the records of the Sub-committee and in correspondence relating to the work of that committee.

BOOKS AND REPORTS

The Building of a Nation's Health.
By Sir George Newman. The Macmillan Company of Canada, Toronto, 1939. 472 pages. $6.25.

FOR many years Sir George Newman, first as Chief Medical Officer of the Board of Education of England and Wales, and latterly as Chief Medical Officer of the Ministry of Health, outlined annually the work carried on by those associated with the health services to which he gave official direction. These reports were much more than the ordinary official statement of departmental activities: they were a stimulating record of trial and error, of new ground broken, of aspirations and hopes, as well as achievements and failures. Those privileged to read these reports often regretted that the natural restrictions of his office precluded the writer from recording in logical sequence not only the progress made but the objectives of the major services and the obstacles which stood in the way of their realization.

In his recent book, THE BUILDING OF A NATION'S HEALTH, Sir George does what many of us have hoped for. With the clarity of expression one would anticipate, he reviews in sufficient but not unnecessary detail the steps taken by the governmental authorities during the last century in their efforts to ensure for the British people not a modicum but a maximum of those things that are essential to physical and social well-being.

While the book is divided into logical subdivisions, each in itself a complete statement on the phase of the subject dealt with, the interrelationship between such divisions is evident to the most casual reader. Worthy of note is the fact that not only in the sections specifically devoted to the progress of medical care, but throughout the entire work, the intimacy of the relationship between the curative and the preventive sides of medicine is emphasized. Sanitary science and public health are not things apart but are essential aspects of the health and welfare program ultimately to be made available to all of the people of Great Britain.

The book is not only concise, convincing and authoritative, but like everything previously written by the author, is worth reading for its literary value alone.

J. T. Phair

Brucellosis in Man and Animals. *By I. Forest Huddleson. Contributing authors: A. V. Hardy, J. E. Debono, and Ward Giltner. The Commonwealth Fund, New York, 1939. 331 pages. $3.50.*

BRUCELLOSIS IN MAN AND ANIMALS is an enlarged and extended edition of a book published by the senior author in 1934. The bacteriology of the micro-organism is thoroughly considered and the methods of differentiation of various species is complete. Brucellosis of human beings is dealt with in detail and this part is exceptionally well written. Brucellosis of animals is given consideration but is less complete. Diagnosis by laboratory and allergic methods is also discussed. Allergic tests have been given very careful consideration, and if the author's premises were admitted this section would form the most important part of the book.

The publication brings together much useful information but one could wish that the material were better arranged. Perhaps because the authors individually prepared sections, information on a common subject is sometimes scattered throughout the book and certain material is included that might with advantage have been left out. Thus two pages are given to the legal basis for the control of Bang's disease in Michigan when the majority of potential readers, not being residents of that State, have little interest in this.

If the objective was to prepare a text book, some of the factors might have been dealt with in greater detail or the senior author's own work might have been condensed, bringing into truer proportion the factors considered. The illustrations are good and altogether the publication will form a creditable addition to any library.

Charles A. Mitchell

CURRENT HEALTH LITERATURE

These abstracts are intended to direct attention to articles that have appeared in other journals during the past month. Any of the journals referred to may be borrowed for three days or longer if desired. Address requests to the secretary of the Editorial Board.

Investigations and Observations on Inoculation Technique

THE investigations set forth in this paper were carried out as the result of an action for damages raised in the High Court in Dublin. Some twenty-five children became infected with tuberculosis following an inoculation against diphtheria, and the plaintiffs, representing some of the children, claimed this infection to be due to the injection of a suspension of living tubercle bacilli issued in error by the manufacturers instead of toxoid-antitoxin floccules (T.A.F.). During the course of the investigation many points of major importance to the medical profession, and to manufacturers of biological products for inoculations, were raised.

Ill effects from injections of biological products are rare but might conceivably occur as the result of pathogenic micro-organisms or their toxins being present in the material injected. These might gain access either during the process of manufacture or packing, or at the time of administration. Only a few of the important experiments carried out can be mentioned here. They pertain to the effective duration of 0.5 per cent. phenol preservative against the tubercle bacillus, the possible contamination of rubber caps before waxing, and the duration of time between waxing and injection. The question of accidental substitution of living tubercle bacilli for T.A.F. was dealt with.

It was shown that the course of the infection which followed was not compatible with the use of living tubercle

bacilli in a suspension so strong as to resemble T.A.F. in opacity. If children of these ages had been inoculated with such massive doses of living tubercle bacilli (6,000 to 9,000 million organisms per cc.), grave infections, with rapid dissemination and many deaths, would almost certainly have occurred. In the present group only one fatality occurred. In most of the other children the infection apparently remained localized to the site of inoculation in the arm and the related axillary glands. Furthermore, the reactions were not such as would have followed the injection of tuberculin.

Experiments were carried out to show how contamination of material at the time of administration might occur. These dealt with the use of imperfectly sterilized syringes and needles, the contamination of syringes and needles after sterilization, and the possibility of droplet infection involving syringes, needles, and caps. It was shown how the caps may be imperfectly sterilized before puncture. Finally, the possibility of infection from the subject inoculated was studied and it was shown that if an infective focus is struck with the needle, many cases of illness of the same type may be produced so long as the same syringes and needles are used for several injections without adequate disinfection. If one case has an unrecognized tuberculous lesion, then that patient and also those subsequently inoculated, using the same needle, may all develop localized tuberculous foci at the sites of inoculation. If a single bottle containing multiple doses of an injectible preparation had been used for the injection in such an instance, it would be naturally regarded as the source of the trouble.

Among the many interesting deductions arrived at, these might be pointed out in conclusion: (a) 0.5 per cent. phenol used as the preservative of biological products kills all non-sporing bacteria including tubercle bacilli within seven days; (b) contamination on the external surface of the rubber cap of the bottle of a biological product can be introduced into the contained fluid when the cap is pierced by a needle and any such contamination of the needle or in the syringe may infect the entire contents of such a bottle; (c) such contamination may occur through inadequate sterilization, droplet infection or contact with infected material after sterilization. The dangers of droplet infection in inoculation work and the efficacy of alcohol, iodine, ether and other antiseptics are briefly discussed. A simple procedure to insure satisfactory sterilization of needles and syringes is suggested.

J. W. Bigger, J. W. S. Blacklock, and H. J. Parish, Brit. M. J., 1940, Jan. 20, p. 79.

Cultivation of Phase I H. pertussis in Semi-synthetic Liquid Medium

THE use of blood or serum to obtain growth of *H. pertussis* has in the past been found necessary. Successful results are recorded in this article using a semi-synthetic medium consisting of hydrolized casein, soluble starch, and certain salts. The study has demonstrated that *H. pertussis* can be satisfactorily grown in a serum-free liquid medium and that the organism remains in Phase I. It was found that certain polysaccharides and certain sulphur-containing compounds are essential for growth. In view of the practical difficulties relating to the present methods of the preparation of whooping-cough vaccine, the introduction of this medium may constitute an important advance.

J. W. Hornibrook, U.S. Pub. Health Rep., 1939, *54*: 1847.

Outbreak of Staphylococcus Milk Poisoning in Pasteurized Milk

AN outbreak of 29 cases among students in an agricultural college is reported. The patients suffered from nausea, vomiting, cramps, and diarrhoea. Investigation showed that all had drunk milk which had been supplied from one pasteurizing plant.

Examination of the records of the plant revealed that the milk had been properly pasteurized and the equipment was satisfactory. Three of the employees of the plant were found to harbour haemolytic staphylococci and one had pustules on his face and body. No mention is made of the demonstration of enterotoxin and the authors speak of the staphylococci as "potentially toxic". It is suggested that the milk was contaminated after pasteurization.

John F. Hackler, Am. J. Pub. Health, 1939, *29*: 1247.

Dental Programs sponsored by Health Agencies in Ninety-four Selected Counties

IN slightly over three-quarters of the 94 counties surveyed for purposes of the Health Facilities Study of the National Health Inventory, conducted during the winter of 1935-36 by the U.S. Public Health Service, it was found that some type of public dental program is sponsored by one or more official or non-official health agencies. In 22 there was no definite provision for public dental service through health agencies. The majority of these counties were rural. In only one county without dental service sponsored by public health agencies did the population exceed 100,000. Agencies supplying dental services in the 72 counties included 100 health departments, 169 other official agencies, and 121 voluntary health organizations. Great variation characterizes the programs sponsored by different health agencies. Some provide only examination while others perform some of the corrective work indicated. The study summarizes the extent of the dental services.

Joseph W. Mountin and Evelyn Flook, U.S. Pub. Health Rep., 1939, *54*: 1625.

The Rickettsioses of North America

This paper gives a comprehensive picture of the human diseases caused by the rickettsiae. The rickettsiae commonly pathogenic for man and transmitted by arthropods are listed: *R. prowazeki* of typhus fever, *R. rickettsii* of Rocky Mountain spotted fever, *R. nipponica* of tsutsugamushi, and *R. quintana* of trench fever. In addition, two more recently described are listed: *R. burneti* of "Q" fever and *R. diapòrica*. The paper includes in its scope detailed descriptions of the louse-borne epidemic form of typhus fever and the flea-borne endemic, or sporadic, form of typhus fever. An account of Brill's disease and its association with classical epidemic typhus fever is discussed. The history, geographical distribution, and clinical picture of tick-borne Rocky Mountain spotted fever is fully dealt with. Finally, the means of prevention and present-day status of vaccine therapy of these two most common rickettsial diseases are presented.

R. E. Dyer. Trans. & Stud., Coll. Physicians, Philadelphia, 1939, *7*: 232.